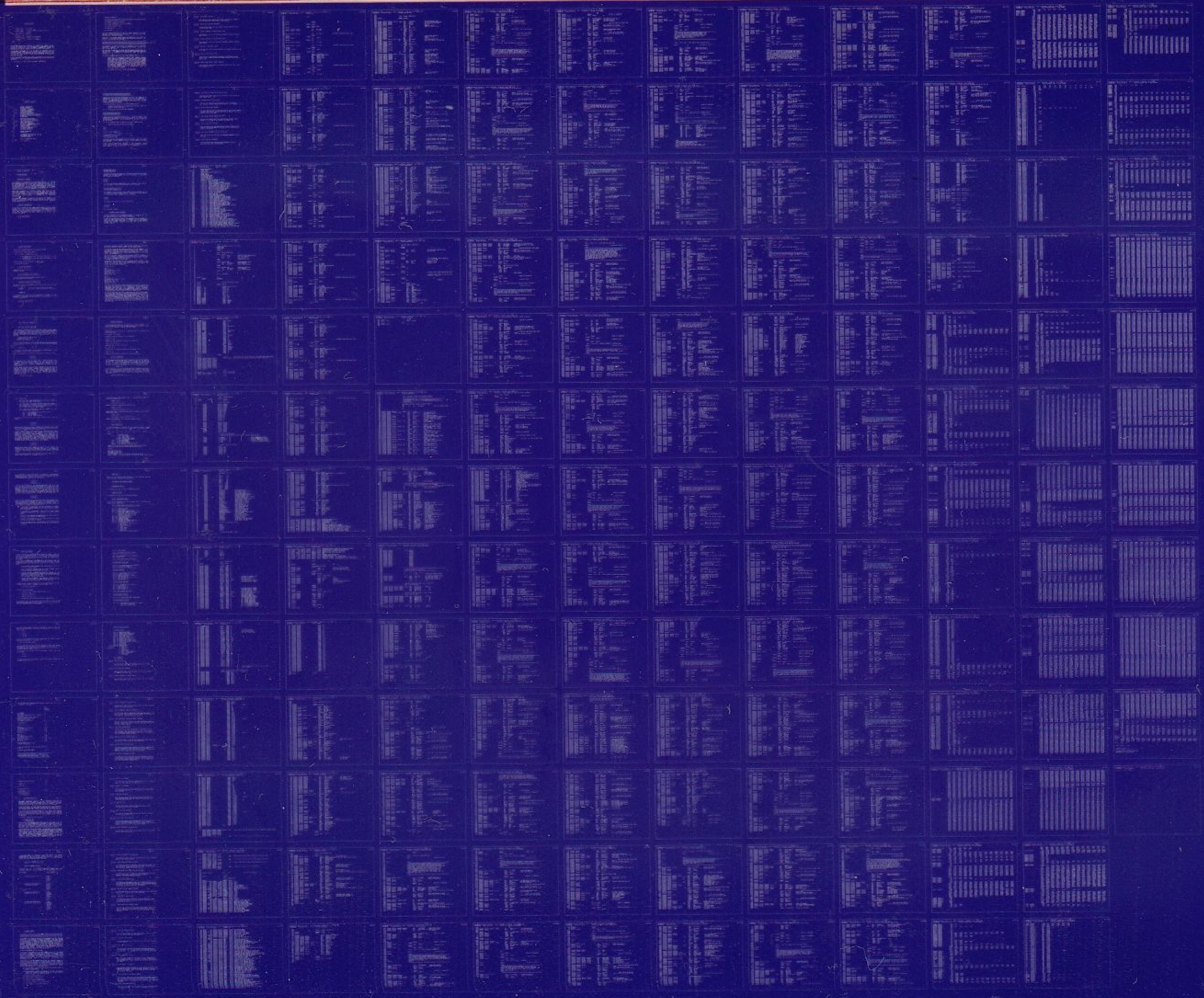
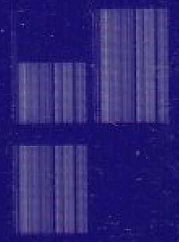
RL11,RLV11

RL11/RLV11 CTLR TST 2 AH-F114B-MC
CZRLHBO FICHE 1 OF 1

MAR 1980
COPYRIGHT© 77 80
MADE IN USA





IDENTIFICATION

PRODUCT CODE: AC-F115B-MC

PRODUCT NAME: CZRLHBO RL11/RLV11 CONTROLLER TEST 2

DATE CREATED: 5-JAN-79

REVISED: 7-DEC-79

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHORS: D. DEKNIS, C. CAMPBELL

THE INFORMATION IN THIS DOCUMENT IS SUBJECT TC CHANGE WITHOUT NOTICE AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY DIGITAL EQUIPMENT CORPORATION. DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY FOR ANY ERRORS THAT MAY APPEAR IN THIS MANUAL.

THE SOFTWARE DESCRIBED IN THIS DOCUMENT IS FURNISHED TO THE PURCHASER UNDER A LICENSE FOR USE ON A SINGLE COMPUTER SYSTEM AND CAN BE COPIED (WITH INCLUSION OF DIGITAL'S COPYRIGHT NOTICE) ONLY FOR USE IN SUCH SYSTEM, EXCEPT AS MAY OTHERWISE BE PROVIDED IN WRITING BY DIGITAL.

DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY OF ITS SOFTWARE ON EQUIPMENT THAT IS NOT SUPPLIED BY DIGITAL.

TABLE OF CONTENTS

1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

1.1.1 STRUCTURE OF PROGRAM

THIS DIAGNOSTIC IS COMPATIBLE WITH BOTH XXDP+ AND ACT. IT CAN BE RUN STANDALONE UNDER XXDP+, AND CAN BE CHAINED UNDER XXDP+, ACT AND APT IN ACT MODE (SEE 2.2 ''CHAIN MODE OPERATION'' FOR DETAILS OF CHAINING PROCEDURE). IT IS A SINGLE PROGRAM FROM THE STANDPOINT OF THE DIAGNOSTIC USER, WHICH AT RUN TIME IS APPENDED TO A COMMON FRONT-END PIECE OF SUPERVISOR SOFTWARE THROUGH WHICH THE DIAGNOSTIC PROGRAM INTERFACES TO THE ENVIRONNMENT AS IT EXECUTES.

WHEN THIS DIAGNOSTIC IS STARTED, CONTROL GOES FIRST TO THE SUPERVISOR PORTION, WHICH WILL ASK CERTAIN ''HARD CORE'' QUESTIONS ABOUT THE ENVIRONMENT. THEN IT WILL ENTER COMMAND MODE, INDICATED BY A PROMPT CHARACTER (DR>). AT COMMAND MODE THE OPERATOR MAY ENTER ANY OF SEVERAL COMMANDS AS DESCRIBED IN 2.0 ''OPERATING INSTRUCTIONS''.

THE DIAGNOSTIC PROGRAM IS LOADED IN THE LOWER 8K OF MEMORY. THE DIAGNOSTIC SUPERVISOR CODING OCCUPIES 6.25K OF THE UPPER PART OF MEMORY JUST BELOW THE XXDP+ MONITOR WHICH RESIDES IN THE UPPERMOST 1.5K OF MEMORY SPACE.

1.1.2 DIAGNOSTIC INFORMATION

THE RL11/RLV11 CONTROLLER TEST (PART 2) IS A PDP-11 (LSI-11) BASED PROGRAM THAT WILL TEST THE CONTROLLER. IT COMPLEMENTS PART 1 BY EXTENDING THE TEST COVERAGE TO INCLUDE WRITE DATA, READ DATA, WRITE CHECK AND READ DATA WITHOUT HEADER COMPARE. IT IS AIMED AT FULLY TESTING THE CONTROLLER IN THESE AREAS, BUT BY DEFAULT ALSO EXERCISES THE DRIVE.

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE REQUIREMENTS

- * PDP-11/LSI-11 PROCESSOR WITH 16K OR MORE OF MEMORY
- * CONSOLE DEVICE (LA30,LA36,VT50,ETC.)
- * 1 OR 2 RL11/RLV11 CONTROLLER(S) WITH:

  1 - 8 RL01 DRIVES WITH RL01K CARTRIDGES CONTAINING A 'BAD SECTOR FILE'
  1 - 8 RL02 DRIVES WITH RL02K CARTRIDGES CONTAINING A 'BAD SECTOR FILE'

- * KW11P OR KW11L CLOCK (REQUIRED TO PERFORM TEST 7)
- * LINE PRINTER (OPTIONAL)

1.2.2 SOFTWARE REQUIREMENTS

CZRLHA RL11/RLV11 CTLR TEST 2
(FORMERLY CZRLBB)

1.3 RELATED DOCUMENTS AND STANDARDS

RL01 DISK SUBSYSTEM USER'S GUIDE (EK-RL01-UG-002)
XXDP+/SUPERVISOR USER'S MANUAL

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

THE RL01/02 SUBSYSTEM SHOULD HAVE SUCCESSFULLY RUN THE FOLLOWING PROGRAMS:

CVRLAB0	RLV11 RL01 DISKLESS TEST (RLV11 ONLY)
CZRLGB0	RL11/RLV11 RL01/02 CONTROLLER TEST (PART 1)

1.5 ASSUMPTIONS

THE HARDWARE OTHER THAN THE RL01/02 SUBSYSTEM IS ASSUMED TO WORK PROPERLY. FALSE ERRORS MAY BE REPORTED IF THE PROCESSOR, ETC., DO NOT FUNCTION PROPERLY.

2.0 OPERATING INSTRUCTIONS

2.1 HOW TO RUN THIS DIAGNOSTIC

2.1.1 THE FIVE STEPS OF EXECUTION

THIS DIAGNOSTIC PROGRAM SHOULD BE LOADED AND STARTED USING NORMAL XXDP+ PROCEDURES. START THE EXECUTION OF THE XXDP+ MONITOR BY USING THE APPROPRIATE BOOTSTRAP PROGRAM. THE MONITOR WILL PRINT A MESSAGE IDENTIFYING ITSELF AND REQUESTING THAT THE CURRENT DATE BE ENTERED. AN EXAMPLE OF THIS MESSAGE IS GIVEN BELOW FOR THE XXDP+ MONITOR:

```
CHMDKA0 XXDP+ DK MONITOR NNK
BOOTED VIA UNIT 0
ENTER DATE (DD-MMM-YY):
```

AFTER THE DATE HAS BEEN ACCEPTED BY THE MONITOR THE RESTART ADDRESS OF THE MONITOR IS PRINTED. THEN THE FOLLOWING TWO QUESTIONS ARE ASKED:

```
50 HZ ? N
LSI ?   N
```

THE DEFAULTS ARE BOTH ''NO''. TYPE ''R'' AND THE PROGRAM NAME TO RUN THE PROGRAM. DO NOT TYPE THE EXTENSION.

WHEN THIS DIAGNOSTIC IS STARTED THE FOLLOWING 5 STEPS WILL OCCUR:

```
***********
* STEP 1 *
***********
```

THE DIAGNOSTIC WILL ISSUE THE PROMPT ''DR>''. FROM THIS POINT UNTIL THE TIME WHEN YOU RESTART XXDP+, YOU WILL BE TALKING TO THE DIAGNOSTIC, NOT XXDP+. WE WILL REFER TO THE PRESENCE OF THIS PROMPT AS BEING IN DIAGNOSTIC COMMAND MODE, AS OPPOSED TO XXDP+ COMMAND MODE.

AT THIS POINT YOU WILL ENTER A ''START'' COMMAND. THIS IS NOT THE SAME AS THE XXDP+ ''START'' COMMAND, WHICH YOU ALREADY ISSUED IN RESPONSE TO THE XXDP DOT PROMPT. THIS ''START'' COMMAND CAN TAKE A NUMBER OF SWITCHES AND FLAGS (ALL OPTIONAL) AND THE DETAILS OF THESE ARE SET FORTH IN 2.3 ''DETAILS OF COMMANDS AND SYNTAX''. HOWEVER, IN ORDER TO USE THE PROGRAM, ALL YOU NEED TO SAY IS SOMETHING LIKE THIS:

```
STA/PASS:1/FLAGS:HOE
```

THINGS TO NOTE HERE:

1. ONLY THE FIRST THREE CHARACTERS OF THIS OR ANY COMMAND AT THE ''DR>'' LEVEL NEED TO BE TYPED.

2. THE ''PASS'' SWITCH SPECIFIES HOW MANY PASSES YOU DESIRE. A PASS CONSISTS OF RUNNING THE FULL DIAGNOSTIC AGAINST ALL UNITS BEING TESTED (THIS WILL BE EXPLAINED SHORTLY). ONE PASS IS SPECIFIED IN THE ABOVE EXAMPLE.

3. THE ''FLAGS'' SWITCH MAY SPECIFY ANY OF A NUMBER OF FLAGS, BUT THE MAIN USEFUL ONES ARE:

PNT	PRINT NUMBER OF TEST BEING EXECUTED
LOE	LOOP ON ERROR
HOE	HALT ON ERROR
IER	INHIBIT ERROR PRINTOUT

THE HOE FLAG IS SPECIFIED IN THE ABOVE EXAMPLE (WE'LL SEE WHY SHORTLY).

```
***********
* STEP 2 *
***********
```

WHEN YOU HAVE TYPED IN A ''START'' COMMAND, THE DIAGNOSTIC WILL COME BACK WITH THE QUESTION ''# UNITS?'' TO WHICH YOU SHOULD RESPOND BY TYPING IN THE NUMBER OF DEVICES YOU WISH TO TEST.

A WORD OF WARNING HERE: THE NUMBER OF UNITS DEPENDS ON THE TARGET DEVICE OF THE DIAGNOSTIC. FOR EXAMPLE, IF THE DIAGNOSTIC IS DIRECTED AT A DISK DRIVE, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF DRIVES TO BE TESTED. WHEREAS IF THE DIAGNOSTIC WAS DIRECTED AT THE DISK CONTROLLER, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF CONTROLLERS. THE TARGET DEVICE OF A DIAGNOSTIC CAN ALWAYS BE DETERMINED BY INSPECTING THE ''HEADER'' STATEMENT NEAR THE BEGINNING OF THE SOURCE CODE. ONE OF THE OPERANDS OF THIS ''HEADER'' STATEMENT SHOULD BE THE DEVICE TYPE OF THE DIAGNOSTIC.

```
***********
* STEP 3 *
***********
```

WHEN YOU HAVE TYPED IN THE NUMBER OF UNITS TO BE TESTED, THE DIAGNOSTIC WILL ASK YOU THE ''HARDWARE QUESTIONS''. THE ANSWERS TO THESE QUESTIONS ARE USED TO BUILD TABLES IN CORE, CALLED ''HARDWARE P-TABLES''. ONE HARDWARE P-TABLE WILL BE BUILT FOR EACH UNIT TO BE TESTED.

THERE ARE SEVERAL HARDWARE QUESTIONS AND THE ENTIRE SERIES WILL BE POSED N TIMES, WHERE N IS THE NUMBER OF UNITS.

THIS REPRESENTS A NEW PHILOSOPHY IN DIAGNOSTIC ENGINEERING. DIAGNOSTICS IN THE FUTURE WILL NOT BE WRITTEN TO AUTOSIZE OR ASSUME STANDARD ADDRESSES: INSTEAD, THEY WILL ASK THE OPERATOR FOR ALL THE INFORMATION THEY NEED TO TEST THE DEVICE.

```
***********
* STEP 4 *
***********
```

AFTER YOU HAVE ANSWERED ALL THE HARDWARE QUESTIONS (SEC 2.5) FOR ALL THE UNITS, YOU WILL BE ASKED ''CHANGE SW?'' IF YOU WANT TO BE ASKED THE SOFTWARE QUESTIONS THAT DETERMINE THE BEHAVIOR OF THIS PROGRAM, TYPE ''Y''. IF YOU WANT TO TAKE ALL THE DEFAULTS TO THESE QUESTIONS, TYPE ''N''. IF YOU TYPE ''Y'' YOU WILL BE ASKED THE SOFTWARE QUESTIONS (SEC 2.6), AND THE ANSWERS WILL BE PUT INTO THE SOFTWARE P-TABLE IN THE PROGRAM. THE SERIES OF QUESTIONS WILL BE ASKED JUST ONCE, REGARDLESS OF THE NUMBER OF UNITS TO BE TESTED.

```
***********
* STEP 5 *
***********
```

AFTER YOU HAVE ANSWERED THE SOFTWARE QUESTIONS, THE DIAGNOSTIC WILL BEGIN TO EXECUTE THE HARDWARE TEST CODE. THERE ARE SEVERAL THINGS THAT CAN HAPPEN NEXT, DEPENDING ON WHETHER A HARDWARE ERROR IS ENCOUNTERED AND ALSO ON WHAT SWITCH VALUES YOU SELECTED ON THE START COMMAND. CONSIDER THE POSSIBILITIES:

1. IF NO ERROR IS ENCOUNTERED, THEN THE DIAGNOSTIC WILL SIMPLY EXECUTE THE DESIRED NUMBER OF PASSES AND RETURN TO COMMAND MODE (PROMPT DR>).

2. IF AN ERROR IS ENCOUNTERED, THEN ONE OF THREE THINGS HAPPENS, DEPENDING ON THE SETTINGS OF THE HOE AND LOE FLAGS.

   HOE SET: THE ERROR WILL BE REPORTED ON THE CONSOLE AND THE DIAGNOSTIC WILL RETURN TO COMMAND MODE.

   LOE SET: THE DIAGNOSTIC WILL LOOP ENDLESSLY ON THE BLOCK OF CODE THAT DETECTED THE ERROR.

   NEITHER HOE NOR LOE SET: THE ERROR WILL BE REPORTED ON THE CONSOLE AND NORMAL EXECUTION WILL RESUME AS IF NO ERROR HAD OCCURRED.

2.1.2 SAMPLE RUN-THROUGH

LET'S SEE HOW ALL THIS WORKS IN A REAL SITUATION. RECALL THAT WE ENTERED THE COMMAND ''STA/PASS:1/FLAGS:HOE''. THIS WOULD BE A VERY TYPICAL WAY TO RUN THE DIAGNOSTIC. IF NO ERRORS ARE ENCOUNTERED, THE SINGLE REQUESTED PASS WILL BE EXECUTED AND THE PROMPT WILL BE RE-ISSUED.

IF AN ERROR IS ENCOUNTERED, THE ERROR WILL BE REPORTED AND THE PROMPT WILL BE REISSUED (BECAUSE THE HOE FLAG IS SET). AT THIS POINT THERE ARE FOUR DIFFERENT WAYS YOU CAN GET THE PROGRAM GOING AGAIN:

1. ISSUE ANOTHER ''START'' COMMAND (THUS GOING THRU ALL OF STEPS 1, 2, 3, 4, AND 5 AGAIN).

2. ISSUE A ''RESTART'' COMMAND (SAME AS START COMMAND EXCEPT THAT THE HARDWARE QUESTIONS ARE NOT ASKED).

3. ISSUE A ''CONTINUE'' COMMAND (EXECUTION WILL RESUME AT THE BEGINNING OF THE PARTICULAR HARDWARE TEST (MOST DIAGNOSTICS CONSIST OF A NUMBER OF THESE) THAT IT WAS IN WHEN THE ERROR HALT OCCURRED. NO QUESTIONS ASKED.

4. ISSUE A ''PROCEED'' COMMAND: EXECUTION WILL RESUME AT THE INSTRUCTION FOLLOWING THE ERROR REPORT (THIS IS A SPECIAL COMMAND AND CAN BE ISSUED ONLY AT A HALT ON ERROR).

THE MOST TYPICAL THING TO DO HERE IS TO ISSUE THE PROCEED, BUT WITH DIFFERENT FLAG SETTINGS. PROBABLY YOU WOULD WANT TO SAY:

```
PRO/FLAGS:IER:LOE:HOE=0
```

THIS WILL DO THE FOLLOWING:

1. TURN ON THE IER (INHIBIT ERROR PRINTOUT) FLAG

2. TURN ON THE LOE FLAG

3. TURN OFF THE HOE FLAG

4. RESUME EXECUTION AT INSTRUCTION AFTER ERROR REPORT

THE DIAGNOSTIC WILL NOW LOOP ON THE BLOCK OF CODE THAT DETECTED AND REPORTED THE ERROR, BUT NO ERROR PRINTOUT WILL OCCUR. THUS YOU CAN STUDY THE ERROR OR SCOPE IT OR WHATEVER.

WHEN YOU'VE SEEN ENOUGH, YOU MAY HIT CONTROL/C. THIS WILL TAKE YOU OUT OF THE LOOP AND PUT YOU BACK INTO COMMAND MODE. YOU NOW HAVE THREE CHOICES:

1. START

2. RESTART

3. CONTINUE

LET'S SAY YOU'VE REPAIRED THE DEFECT FOUND ABOVE AND WANT TO FINISH RUNNING THE DIAGNOSTIC. YOU WOULD TYPE

```
CON/FLAGS:HOE:IER=0:LOE=0
```

THIS WILL RESTORE THE FLAGS TO THEIR ORIGINAL VALUES AND RESUME EXECUTION AT THE BEGINNING OF THE HARDWARE TEST YOU WERE IN. IF THE ERROR DOES NOT RECUR, THE EXECUTION WILL FLOW RIGHT ON THRU TO THE NEXT ERROR OR TO END OF PASS.

IF AT END OF PASS YOU WANT TO RUN THE DIAGNOSTIC AGAIN, YOU HAVE TWO CHOICES:

1. START

2. RESTART

YOU WOULD CHOOSE ONE, DEPENDING ON WHETHER YOU WANTED TO ANSWER THE HARDWARE QUESTIONS AGAIN.

```
THE FULL PRINT-OUT FROM THE ABOVE DIALOGUE  MIGHT  LOOK  LIKE  THIS
(O=OPERATOR, D=DIAGNOSTIC):

                                            BY
                                            WHOM
                                            ENTERED:
                                            --------

.R CZRLHB                                   O
DRS LOADED                                  D
DIAG. RUN-TIME SERVICES REV. D APR-79       D
CZRLH-B-0                                   D
CZRLH TESTS WRITE DATA, READ DATA,          D
AND WRITE CHECK OPERATIONS
UNIT IS RL01, RL02                          D
DR>STA/PASS:1/FLAGS:HOE                     D,O

CHANGE HW (L) ? Y                           D,O

# UNITS (D) ? 2                             D,O

UNIT 0                                      D
BUS ADDRESS (O) 174400 ?                    D,O
VECTOR (O) 160 ?                            D,O
DRIVE TYPE = RL01 (L) Y ?                   D,O
BR LEVEL (O) 5 ?                            D,O
DRIVE (O) 0 ?                               D,O

UNIT 1                                      D
RL11 (L) Y ?                                D,O
BUS ADDRESS (O) 174400 ?                    D,O
VECTOR (O) 160 ?                            D,O
DRIVE TYPE = RL01 (L) ? N                   D,O (N=RL02)
BR LEVEL (O) 5 ?                            D,O
DRIVE (O) 0 ?                               D,O

DROP ON ERROR LIMIT (L) N ?
COMPARE DATA ON DCK (L) N ?


CZRLH HRD ERR 00004 TST 003 SUB 002 PC:004130
ERR HLT

DR>PRO/FLAGS:IER:LOE:HOE=0                  D,O


***************************************************
AT THIS POINT THE DIAGNOSTIC IS LOOPING ON THE
ERROR WITHOUT PRINTING ANYTHING.  YOU CAN SCOPE
THE ERROR UNTIL YOU HAVE LOCATED IT, THEN ^C OUT
***************************************************
```

```
^C                                      0

DR>CON/FLAGS:HOE:IER:LOE=0              D,0

CHANGE SW (L) ? N                       D,0

CZRLH EOP 1                             D
^C

DR>RESTART/PASS:1                       D,0

CHANGE SW (L) ? N                       D,0
-----------------
-----------------
-----------------
-----------------
```

2.2 CHAIN MODE OPERATION

CHAIN MODE OPERATION CONSISTS OF THE SEQUENTIAL EXECUTION OF PROGRAMS WITHOUT OPERATOR INTERVENTION. ONLY PROGRAMS THAT HAVE BEEN MODIFIED TO RUN IN CHAIN MODE CAN BE CHAINED. CHAINABLE PROGRAMS ARE IDENTIFIED IN THE DIRECTORY BY A BIC EXTENSION.

TO RUN CHAIN MODE, THE XXDP+ MONITOR USES AN ASCII FILE (KNOWN AS A CHAIN FILE) LISTING THE PROGRAMS TO BE RUN AND THE NUMBER OF PASSES EACH PROGRAM SHOULD RUN. THIS FILE MUST BE ON THE SYSTEM DEVICE.

A CHAIN FILE MAY BE GENERATED BY USE OF THE XTECO TEXT EDITOR. THIS FILE MUST HAVE A CCC EXTENSION. THE CHAIN FILE MAY CONTAIN ANY OF THE COMMANDS SUPPORTED BY THE XXDP+ MONITOR. THE COMMANDS IN THE ASCII FILE ARE EXECUTED IN THE ORDER IN WHICH THEY ARE ENCOUNTERED.

TO EXECUTE A CHAIN FILE THE USER TYPES:

```
        C FILNAM <CR> OR
        C FILNAM/QV  <CR>
```

IN THE FIRST CASE THE PASS COUNT SPECIFIED IN THE CHAIN FILE IS USED BY THE XXDP+ MONITOR TO DETERMINE THE NUMBER OF PASSES TO EXECUTE EACH PROGRAM. IN THE SECOND CASE THE PASS COUNT IS NOT USED AND EACH PROGRAM IS EXECUTED ONLY ONCE. THE /QV SWITCH PROVIDES A SINGLE EXECUTION MODE OF OPERATION OF QUICK VERIFY.

WHEN PROGRAMS ARE RUN IN CHAIN MODE, THE SOFTWARE SWITCH REGISTER SHOULD BE SET TO 000000. THE XXDP+ MONITOR PRINTS EACH COMMAND TAKEN FROM THE CHAIN FILE AND THEN EXECUTES THE COMMAND. WHEN THE LAST COMMAND OTHER THAN ANOTHER C COMMAND HAS BEEN EXECUTED THE XXDP+ MONITOR TERMINATES CHAIN MODE AND TYPES A PROMPT (.). IT IS READY TO ACCEPT ANOTHER COMMAND FROM THE CONSOLE. IF THE LAST COMMAND IS ANOTHER C COMMAND, THE CHAIN MODE WILL CONTINUE AND THE CHAIN FILE SPECIFIED BY THIS NEW C COMMAND WILL BE USED.

IF THE USER WISHES TO TERMINATE CHAIN MODE BEFORE ITS NORMAL TERMINATION HE MAY DO SO BY TYPING A CONTROL/C. HOWEVER, THE MONITOR WILL NOT ABORT THE CHAIN MODE UNTIL IT RECEIVES PROGRAM CONTROL FROM THE PROGRAM CURRENTLY RUNNING.

2.3 DETAILS OF COMMANDS AND SYNTAX

2.3.1 TABLE OF COMMAND VALIDITY

THERE ARE FOUR WAYS OF ENTERING DIAGNOSTIC COMMAND MODE, AND DIFFERENT SUBSETS OF THE DIAG COMMAND SET ARE AVAILABLE WITH EACH:

HOW ENTERED		LEGAL COMMANDS
1.	OPERATOR ENTERED 'RUN DIAG'	START PRINT DISPLAY FLAGS ZFLAGS EXIT
2.	DIAGNOSTIC HAS FINISHED ALL ITS REQUESTED PASSES	START RESTART PRINT DISPLAY FLAGS ZFLAGS EXIT
3.	OPERATOR INTERRUPTED THE DIAGNOSTIC WITH CTRL/C	START RESTART CONTINUE PRINT DISPLAY FLAGS ZFLAGS EXIT
4.	AN ERROR WAS ENCOUNTERED WITH THE HOE FLAG SET SET	START RESTART CONTINUE PROCEED PRINT DISPLAY FLAGS ZFLAGS EXIT

2.3.2 COMMAND SYNTAX

```
***********************************************************************
STA(RT)/TESTS:TEST-LIST/PASS:PASS-CNT/FLAGS:FLAG-LIST/EOP:EOP-INCR
***********************************************************************
```

THE DIAGNOSTIC IN CORE IS EXECUTED IN ACCORDANCE WITH THE SWITCHES SPECIFIED. THE MESSAGE ''# UNITS?'' IS PRINTED. THE START COMMAND MAY BE ISSUED WHEN DIAGNOSTIC COMMAND MODE HAS BEEN ENTERED VIA ONE OF THE FOLLOWING: A) OPERATOR TYPED ''RUN DIAGNOSTIC'' B) DIAGNOSTIC FINISHED EXECUTING C) ERROR WAS ENCOUNTERED WITH HOE FLAG SET D) OPERATOR ENTERED CONTROL/C. AFTER THE OPERATOR RESPONDS TO ''# UNITS?'', THE HARDWARE DIALOGUE IS INITIATED. WHEN IT IS COMPLETED, THE QUESTIONS ''CHANGE SW?'' IS ISSUED, AND THE ANSWERS, IF GIVEN, BECOME THE NEW DEFAULTS. THEREFORE IT IS NECESSARY TO RELOAD THE PROGRAM IN ORDER TO RETURN TO THE LOAD DEFAULTS.

THE SWITCH ARGUMENTS ARE AS FOLLOWS:

''TEST-LIST'' IS A SEQUENCE OF DECIMAL NUMBERS (1:2 ETC.) OR RANGES OF DECIMAL NUMBERS (1-5:8-10 ETC.) THAT SPECIFY THE TESTS TO BE EXECUTED. THE NUMBERS ARE SEPARATED BY COLONS. THE NUMBERS RANGE FROM 1 TO THE LARGEST TEST NUMBER IN THE DIAGNOSTIC. THEY MAY BE SPECIFIED IN ANY ORDER. TESTS WILL BE EXECUTED IN NUMERICAL ORDER REGARDLESS OF THE ORDER OF SPECIFICATION. THE DEFAULT IS TO EXECUTE ALL TESTS.

''PASS-CNT'' IS A DECIMAL NUMBER INDICATING THE DESIRED NUMBER OF PASSES. A PASS IS DEFINED AS THE EXECUTION OF THE FULL DIAGNOSTIC (ALL SELECTED TESTS) AGAINST ALL UNITS SUBMITTED. THE DEFAULT IS NON-ENDING TEST EXECUTION. ''FLAG-LIST'' IS A SEQUENCE OF ELEMENTS OF THE FORM <FLAG>, <FLAG=1>, OR <FLAG=0>, SEPARATED BY COLONS, WHERE <FLAG> HAS ONE OF THE FOLLOWING VALUES:

HOE HALT ON ERROR, CAUSING COMMAND MODE TO BE ENTERED WHEN AN ERROR IS ENCOUNTERED

LOE LOOP ON ERROR, CAUSING THE DIAGNOSTIC TO LOOP CONTINUOUSLY WITHIN THE SMALLEST DEFINED BLOCK OF CODING (SEGMENT, SUBTEST, OR TEST) CONTAINING THE ERROR

IER INHIBIT ERROR REPORTING

IBE INHIBIT BASIC ERRUR REPORTS

IXE INHIBIT EXTENDED ERROR REPORTS

PRI DIRECT ALL MESSAGES TO A LINE PRINTER

PNT PRINT NUMBER OF TEST BEING EXECUTED

BOE BELL ON ERROR

UAM RUN IN UNATTENDED MODE, BYPASSING MANUAL INTERVENTION TESTS

ISR INHIBIT STATISTICAL REPORTS

IDU INHIBIT DROPPING OF UNITS BY DIAGNOSTIC

ADR EXECUTE AUTODROP CODE

LOT LOOP ON TEST

EVL EVALUATE

THE FLAGS NAMED OR EQUATED TO 1 ARE SET, THOSE EQUATED TO 0 ARE CLEARED. A FLAG NOT SPECIFIED IS CLEARED. IF THE FLAGS SWITCH IS NOT GIVEN ALL FLAGS ARE CLEARED.

''EOP-INCR'' IS A DECIMAL NUMBER INDICATING HOW OFTEN (IN TERMS OF PASSES) IT IS DESIRED THAT THE END OF PASS MESSAGE BE PRINTED. THE DEFAULT IS AT THE END OF EVERY PASS.

```
************************************************************************
RES(TART)/TEST:TEST-LIST/PASS:PASS-CNT/FLAGS:FLAG-LIST/EOP:EOP-INCR/UNITS:UNIT-LIST
************************************************************************
```

THE DIAGNOSTIC IN CORE IS EXECUTED IN ACCORDANCE WITH THE SWITCHES SPECIFIED. HOWEVER, NEW ''P-TABLES'' ARE NOT BUILT. INSTEAD, THE ONES IN CORE ARE USED.

THE QUESTION ''CHANGE SW?'' IS ASKED AND THE ANSWERS GIVEN BECOME THE NEW DEFAULTS. THE COMMAND MAY BE ISSUED WHEN COMAND MODE HAS BEEN ENTERED VIA A) DIAGNOSTIC IS FINISHED B) HALT ON ERROR C) CONTROL/C.

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

1. ''UNIT-LIST'' IS A SEQUENCE OF LOGICAL UNIT NUMBERS RANGING FROM 1 THRU N (N = NUMBER OF UNITS BEING TESTED) SPECIFYING WHICH UNITS ARE TO BE TESTED. THE LOGICAL UNIT NUMBER DESIGNATES THE POSITION OF THE P-TABLE IN CORE, ACCORDING TO THE ORDER IN WHICH THEY WERE BUILT. THE UNITS SPECIFIED MUST NOT HAVE BEEN DROPPED BY THE OPERATOR DROP COMMAND. THE UNIT-LIST DEFAULTS TO ''ALL THAT HAVE NOT BEEN DROPPED BY OPERATOR COMMAND''. THE EFFECT OF THE UNIT-LIST LASTS UNTIL THE NEXT START (WHERE IT IS AUTOMATICALLY RESET TO ''ALL'') OR THE NEXT RESTART.

2. ALL UNSPECIFIED FLAG SETTINGS ARE UNCHANGED.

```
***********************************************
CON(TINUE)/PASS:<PASS-CNT/FLAGS:<FLAG-LIST>
***********************************************

COMMAND MODE MUST HAVE BEEN ENTERED DUE TO A HALT  ON  ERROR  OR  A
CONTROL/C.   THE EFFECT OF THE COMMAND IS TO GO TO THE BEGINNING OF
THE TEST THAT WAS BEING EXECUTED WHEN THE HALT  OR  CONTROL/C  TOOK
PLACE.   SOFTWARE DIALOGUE MAY OPTIONALLY BE RE-EXECUTED.  HARDWARE
PARAMETERS MAY NOT BE CHANGED.

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

    1.  DEFAULT FOR PASS-CNT IS THE UNSATISFIED PASS-CNT  FROM  THE
        PREVIOUS START OR RESTART

    2.  UNSPECIFIED FLAG SETTINGS ARE UNCHANGED


******************************
PRO(CEED)/FLAGS:<FLAG-LIST>
******************************

COMMAND MODE MUST HAVE BEEN ENTERED  VIA  A  HALT  ON  ERROR.   THE
EFFECT  OF  THE  COMMAND  IS  TO  BEGIN  EXECUTION  AT THE LOCATION
FOLLOWING THE ERROR CALL.  NEITHER HARDWARE NOR SOFTWARE PARAMETERS
MAY BE ALTERED.

THE SWITCH ARGUMENTS ARE THE SAME AS THE START COMMAND EXCEPT:

    1.  UNSPECIFIED FLAG SETTINGS ARE UNCHANGED


****
EXIT
****

RETURN TO XXDP+ PROMPT MODE.


************************
DRO(P)/UNITS:UNIT-LIST
************************

THE UNITS SPECIFIED ARE DROPPED FROM TESTING UNTIL THEY  ARE  ADDED
BACK  OR UNTIL A START COMMAND IS GIVEN.  A DROP CANNOT BE FOLLOWED
BY A PROCEED.

THERE IS ALSO A 'DROP'' MACRO  INTERNAL  TO  THE  DIAGNOSTIC,  WHICH
GIVES  THE  FACILITY  OF  AUTO-DROPPING.  THE DURATION OF A PROGRAM
DROP, HOWEVER, IS ONLY UNTIL THE NEXT START OR RESTART.
```

****
ADD/UNITS:UNIT-LIST
****

THE UNITS SPECIFIED ARE ADDED BACK (THEY MUST HAVE BEEN PREVIOUSLY DROPPED BY THE DROP COMMAND) TO THE TEST SEQUENCE. AN ADD CANNOT BE FOLLOWED BY A PROCEED.

****
PRI(NT)
****

ALL STATISTICS TABLES ACCUMULATED BY THE DIAGNOSTIC ARE PRINTED. THE ISR (INHIBIT STATISTICAL REPORTING) FLAG IS CLEARED.

****
DIS(PLAY)/UNITS:<UNIT-LIST>
****

THE HARDWARE P-TABLES FOR ALL UNITS UNDER TEST ARE PRINTED OUT IN THE FORMAT IN WHICH THEY WERE ENTERED. ANY UNITS THAT WERE DROPPED BY THE OPERATOR 'DROP'' COMMAND ARE SO DESIGNATED.

****
FLA(GS)
****

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

****
ZFL(AGS)
****

ALL FLAGS ARE CLEARED.

2.4 EXTENDED P-TABLE DIALOGUE

THE FULL CAPABILITY OF THE HARDWARE DIALOGUE IS REVEALED BY THE FOLLOWING DISCUSSION OF WHAT HAPPENS INTERNALLY.

AS SOON AS THE QUESTION ''# UNITS?'' IS ANSWERED (WITH THE NUMBER N), SPACE IN CORE IS ALLOCATED FOR ''N'' P-TABLES. ALL OF THE P-TABLES ARE OF THE SAME FORMAT, AND THERE IS A ONE-TO-ONE CORRESPONDENCE BETWEEN THE HARDWARE PARAMETER QUESTIONS AND THE SLOTS IN THE P-TABLE FORMAT.

IN GIVING A STRING OF VALUES, COMMAS WITHOUT INTERVENING VALUES MAY BE USED TO INDICATE A REPETITION OF THE LAST NAMED VALUE.

A STRING OF VALUES MAY BE GIVEN AS A RANGE (6-10 FOR EXAMPLE). IF THE VALUES REPRESENT PURE NUMERICAL DATA, THIS SAMPLE RANGE TRANSLATES TO THE STRING 6,7,8,9,10 (AN INCREMENT OF 1). IF THE VALUES ARE ADDRESSES, THE SAMPLE RANGE TRANSLATES TO THE STRING 6,8,10 (AN INCREMENT OF 2).

NOW LET US SEE HOW WE COULD USE THESE CAPABILITIES TO CONSTRUCT A SET OF P-TABLES. ASSUME THAT WE HAVE 8 RL UNITS, AND THAT THERE ARE FIVE (5) HARDWARE PARAMETERS FOR EACH (5 SLOTS IN THE P-TABLE, 5 HARDWARE QUESTIONS IN THE DIALOGUE).

FOLLOWING IS THE DIALOGUE FOR THIS 8 RLOX DRIVE SYSTEM. THIS SYSTEM HAS TWO (2) RL11 TYPE CONTROLLERS ALL TO BE SET AT ''BR LEVEL'' 5. THE FIRST 4 DRIVES ARE RL01'S AND THE LAST 4 DRIVES ARE RL02'S (ON THE SECOND CONTROLLER):

```
# UNITS (D) ? 8

UNIT 0
RL11 (L) Y ?
BUS ADDDRESS (O) 174400 ?
VECTOR (O) 160 ?
DRIVE TYPE = RL01 (L) Y ?
BR LEVEL (O) 5 ?
DRIVE (O) 0 ? 0-3

UNIT 4
RL11 (L) Y ?
BUS ADDRESS (O) 174400 ? 175400
VECTOR (O) 160 ? 164
DRIVE TYPE = RL01 (L) Y ? N
BR LEVEL (O) 5 ?
DRIVE (O) 0 ? 0-3
```

THE FIRST TIME THRU THE P-TABLE QUESTIONS THE DEFAULT VALUES ARE USED FOR THE CONTROLLER TYPE (QUESTION #1), CSR ADDRESS OF THE CONTROLLER (QUESTION #2), THE CONTROLLER VECTOR ASSIGNMENT (QUESTION #3), THE DRIVE TYPE (QUESTION #4), AND THE ''BR LEVEL'' (QUESTION #5). THE ACTUAL UNIT NUMBERS OF THE RL01'S FOR QUESTION #6 WERE ASSIGNED 0 THRU 3 FOR THE FIRST 4 P-TABLE SLOTS.

THE SECOND TIME THRU THE P-TABLE QUESTIONS (FOR THE RL02 ASSIGNMENT ON THE SECOND CONTROLLER), THE FIRST QUESTION DEFAULTED TO ''RL11'' TYPE CONTROLLER. THE SECOND QUESTION WAS ANSWERED TO REFLECT THE CHANGE IN CSR ADDRESS FOR THE RL02 CONTROLLER (175400). THE SECOND CONTROLLER'S VECTOR WAS ALSO CHANGED TO 164 IN QUESTION #3. THE RL02 TEST UNIT NUMBERS WERE ASSIGNED VALUES 0 TO 3 IN QUESTION #4 AND THE DRIVE TYPE WAS SET FOR RL02'S FOR THE REMAINING 4 UNITS IN QUESTION #4. QUESTION #5 WAS DEFAULTED USING THE ''BR LEVEL'' FROM THE FIRST PASS.

2.5 HARDWARE PARAMETERS

THE FOLLOWING QUESTIONS WILL BE ASKED ON A START COMMAND. THE VALUE LOCATED TO THE LEFT OF THE QUESTION MARK IS THE DEFAULT VALUE THAT WILL BE TAKEN ON A CARRIAGE RETURN RESPONSE.

RL11 (L) Y?

ANSWER YES(Y) IF YOU HAVE AN RL11 CONTROLLER, NO(N) IF YOU HAVE AN RLV11 CONTROLLER.

BUS ADDRESS (O) 174400?

ANSWER WITH THE BUS ADDRESS OF THE CONTROLLER.

VECTOR (O) 160?

ANSWER WITH THE INTERRUPT VECTOR OF THE CONTROLLER.

DRIVE TYPE = RL01 (L) ?

ANSWER NO (N) IF DRIVE IS AN RL02

BR LEVEL (O) 5?

ANSWER WITH THE INTERRUPT PRIORITY OF THE CONTROLLER.

DRIVE (O) 0?

ANSWER WITH THE DRIVE(S) CONNECTED TO THE CONTROLLER.

2.6 SOFTWARE PARAMETERS

THE FOLLOWING QUESTIONS ARE ASKED IF REQUESTED ON A START, RESTART, OR CONTINUE. THEY ALLOW FLEXIBILITY IN THE WAY THE PROGRAM BEHAVES. THE SOFTWARE PARAMETERS GIVE THE PROGRAM FLEXIBILITY IN THE WAY IT RUNS. THE PARAMETERS CAN BE MODIFIED ON A START, RESTART, OR CONTINUE BY ANSWERING (Y)ES TO THE FOLLOWING QUESTION:

''CHANGE S.W. ?''

A YES ANSWER WILL ASK THE FOLLOWING SOFTWARE PARAMETER QUESTIONS, WITH THE PRESENT DEFAULT VALUE PRINTED TO THE LEFT OF THE QUESTION MARK. (THE LAST ANSWER GIVEN IS THE DEFAULT) THE DEFAULT IS TAKEN ON A <CR>. CONTROL Z (^Z) WILL DEFAULT ALL REMAINING QUESTIONS AND START THE TEST.

''DROP ON ERROR LIMIT (L) Y?''

TO ALLOW THE UNIT TO BE DROPPED ONCE A PREDETERMINED NUMBER OF ERRORS ARE ENCOUNTERED.

ANSWER Y OR N

''ERROR LIMIT (D) 10?''

NUMBER OF ERRORS ALLOWED BEFORE DROPPING UNIT.

ANSWER 1 TO 65K

''COMPARE DATA ON DCK (L) N?''

WHEN A DATA CHECK IS ENCOUNTERED AND DATA IS KNOWN, ALLOW AN INCORE COMPARISON OF DATA.

ANSWER Y OR N

''# OF WORDS IN ERROR REPORTED (D) 3? ''

NUMBER OF MISCOMPARES TO BE PRINTED ON CONSOLE DEVICE.

ANSWER 0 - 128

3.0 ERROR INFORMATION

ALL ERROR INFORMATION IS PRINTED ON THE CONSOLE DEVICE. ERROR REPORTS ARE AIMED AT BEING SELF EXPLANATORY. THE GENERAL FORMAT IS:

```
DZRL? XXX    ERR  YYYYY   TST  ZZZ   SUB  PPP   PC:  RRRRRR

WHERE:
       ?        IS PROGRAM LETTER
       XXX      IS SFT - SOFT ERROR
                   HRD - HARD ERROR
                DV FAT - DEVICE FATAL ERROR
               SYS FAT - SYSTEM FATAL ERROR
       YYYYY    IS THE ERROR NUMBER
       ZZZ      IS THE TEST NUMBER
       PPP      IS THE SUBTEST NUMBER
       RRRRRR   IS THE PROGRAM LISTING LOCATION
```

ERRORS GIVE THE REGISTER CONTENTS BEFORE AND AFTER THE ERROR ALONG WITH A ONE LINE DESCRIPTION AND RELEVENT DATA.

EXAMPLE:

```
ONE LINE DESCRIPTION
(OPTIONAL SECOND LINE)
(OPTIONAL THIRD LINE)
BEFORE COMMAND: CS:XXXXXX BA:XXXXXX DA:XXXXXX MP:XXXXXX
TIME OF ERROR:  CS:XXXXXX BA:XXXXXX DA:XXXXXX MP:XXXXXX XXXXXX XXXXXX
```

3.1 ERROR HALTS

ERROR HALTS ARE SUPPORTED PER DESCRIBED IN THE PREVIOUS SECTION WITH /FLAG:HOE. THERE ARE NO OTHER HALTS.

4.0 PERFORMANCE AND PROGRESS REPORTS

4.1 PERFORMANCE REPORTS

THIS PROGRAM WILL NOT GIVE ANY PERFORMANCE REPORTS.

4.2 PROGRESS REPORTS

THIS PROGRAM WILL NOT GIVE ANY PROGRESS REPORTS.

5.0 DEVICE INFORMATION TABLES

THE RL11/RLV11 CONTROLLER HAS THE FOLLOWING FOUR(4) REGISTERS FOR CONTROL OF THE SUBSYSTEM.

```
RLCS - CONTROL AND STATUS REGISTER (XXXXX0)
-------------------------------------------

BIT 15 - COMPOSITE ERROR
BIT 14 - DRIVE ERROR
BIT 13 - NON EXISTANT MEMORY ERROR
BIT 12 - HEADER NOT FOUND (WITH BIT 10 SET)
       - DATA LATE (WITH BIT 10 CLEAR)
BIT 11 - HEADER CRC (WITH BIT 10 SET)
       - DATA CRC (WITH BIT 10 CLEAR)
BIT 10 - OPERATION INCOMPLETE
BIT  9/8 - DRIVE SELECT (0-3)
BIT  7 - CONTROLLER READY
BIT  6 - INTERRUPT ENABLE
BIT  5 - EXTENDED BUS ADDRESS (BIT 17)
BIT  4 - EXTENDED BUS ADDRESS (BIT 16)
BIT 3-1 - FUNCTION CODE
          0 - NOP (PDP-11) MAINT (LSI-11)
          1 - WRITE CHECK
          2 - GET DRIVE STATUS
          3 - SEEK
          4 - READ HEADER
          5 - WRITE DATA
          6 - READ DATA
          7 - READ WITHOUT HEADER COMPARE
```

```
BIT  0 - DRIVE READY

RLBA - BUS ADDRESS REGISTER (XXXXX2)
-------------------------------------

BITS 15-1 BUS ADDRESS OF DATA TRANSFER
BIT 0 SHOULD BE 0

RLDA - DISK ADDRESS REGISTER (XXXXX4)
--------------------------------------

FOR READ/WRITE FUNCTIONS
-------------------------

BIT 15-7 - CYLINDER ADDRESS FOR TRANSFER
BIT 6 - SURFACE FOR TRANSFER
BIT 5-0 - SECTOR FOR TRANSFER (1-40.)

FOR SEEK FUNCTION
-----------------

BIT 15-7 - DIFFERENCE TO NEW CYLINDER
BIT 6-5 - MUST BE ZERO (0)
BIT 4 - SURFACE (0=UPPER, 1=LOWER)
BIT 3 - MUST BE ZERO (0)
BIT 2 - SEEK DIRECTION( 1=IN / 0=OUT )
BIT 1 - MUST BE ZERO (0)
BIT 0 - MUST BE ONE (1)

FOR GET STATUS FUNCTION
-----------------------

BIT 15-4 - IGNORED SHOULD BE ZERO (0)
BIT 3 - DRIVE RESET
BIT 2 - MUST BE ZERO (0)
BIT 1 - MUST BE ONE (1)
BIT 0 - MUST BE ONE (1)

RLMP - MULTIPURPOSE REGISTER
----------------------------

FOR READ/WRITE FUNCTION
-----------------------

BIT 15 - 0 - WORD COUNT (TWO'S COMPLIMENT)

FOR READ HEADER FUNCTION
------------------------

BIT 15-0 - DISK HEADER OF SECTOR (FIRST READ)
         - ZERO WORD (SECOND READ)
         - HEADER CRC (THIRD READ)
```

FOR GET STATUS FUNCTION

HAS DRIVE STATUS

```
BIT 15 - WRITE DATA ERROR
BIT 14 - CURRENT HEAD ERROR (CHE)
BIT 13 - WRITE LOCK STATUS (WL)
BIT 12 - SEEK TIME OUT (SKTO)
BIT 11 - SPIN ERROR (SPE)
BIT 10 - WRITE GATE ERROR (WGE)
BIT  9 - VOLUME CHECK (VC)
BIT  8 - DRIVE SELECT ERROR (DSE)
BIT  7 - DRIVE TYPE IS RL02 IF SET
BIT  6 - SURFACE (0=UPPPER, 1=LOWER)
BIT  5 - COVER OPEN
BIT  4 - HEADS HOME
BIT  3 - BRUSHES HOME
BIT 2-0 -STATE BITS
         0 - LOAD STATE
         1 - SPIN UP
         2 - BRUSH CYCLE
         3 - LOAD HEADS
         4 - SEEK - TRACK COUNTING
         5 - SEEK - LINEAR MODE
         6 - UNLOAD HEADS
         7 - SPIN DOWN
```

6.0 TEST SUMMARIES

TEST 1 - WRITE FUNCTION

THIS TEST WILL VERIFY THAT THE WRITE FUNCTION WILL RESET CONTROLLER READY AND POST NO ERRORS.

TEST 2 - WRITE FUNCTION INTERRUPT

THIS TEST WILL VERIFY THAT THE WRITE FUNCTION WILL GENERATE AN INTERRUPT ON COMPLETION.

TEST 3 - PROPER INCREMENT OF RLBA ON WRITE

THIS TEST WILL VERIFY THAT THE BUS ADDRESS REGISTER INCREMENTS PROPERLY ON A WRITE FUNCTION.

TEST 4 - PROPER INCREMENT OF RLDA ON WRITE
******

THIS TEST WILL VERIFY THAT THE DISK ADDRESS REGISTER INCREMENTS PROPERLY ON A WRITE FUNCTION.

TEST 5 - FORCE HEADER NOT FOUND WITH WRITE
******

THIS TEST WILL FORCE A HEADER NOT FOUND ERROR ON A WRITE. THE RLDA IS SET UP TO LOOK FOR SECTOR 40, A WRITE IS THEN ISSUED. THE HEADER NOT FOUND ERROR SHOULD THEN SET.

TEST 6 - FORCE HEADER NOT FOUND WITH WRITE INTERRUPT
******

THIS TEST WILL FORCE A HEADER NOT FOUND ERROR UNDER INTERRUPT CONTROL. HEADER NOT FOUND IS FORCED BY SETTIING SECTOR 40 OF RLDA AND ISSUING A WRITE.

TEST 7 - CHECK OPI TIME WITH HNF
******

(KW11-L OR KW11-P CLOCK IS REQUIRED TO PERFORM THIS TEST)

THIS TEST WILL TIME THE SETTING OF HNF (OPI) FROM ISSUANCE. THIS IS DONE BY ISSUING A WRITE TO SECTOR 40. THE TIME OF OPI SHOULD BE AROUND 200 MILLISECONDS.

TEST 8 - MULTIPLE SECTOR TRANSFER ON WRITE
******

THIS TEST THE ABILITY FOR THE WRITE FUNCTION TO WRITE MORE THAN ONE SECTOR. WE SET UP FOR A TWO SECTOR WRITE.

TEST 9 - CHECK DIRECTION OF WRITE NPR
******

THIS TEST WILL VERIFY THAT THE NPR DIRECTION OF A WRITE FUNCTION IS FROM MEMORY TO THE CONTROLLER. THIS IS DONE BY WRITING A PATTERN IN MEMORY AND ISSUING A WRITE, THEN CHECKING MEMORY TO VERIFY THAT IT DID NOT GET DISTURBED.

TEST 10 - CHECK FULL INCREMENT OF RLBA
****

THIS TEST WILL CHECK THAT THE RLBA CAN INCREMENT OF THE FULL 16 BIT RANGE. THIS IS DONE BY ISSUING A ONE WORD WRITE TO CHECK EACH BIT TOGGLE FROM 1-0 AND 0-1. THIS IS DONE FROM 0 TO 177776 REGARDLESS OF MEMORY SIZE.

TEST 11 - BA BIT 16 INCREMENT
****

THIS TEST WILL CHECK THAT BUS ADDRESS BIT 16 WILL SET WHEN THE RLBA IS 177776. AND THAT THE RLBA GOES TO 0.

TEST 12 - BA BIT 17 INCREMENT
****

THIS TEST WILL CHECK THAT BUS ADDRESS BIT 17 WILL SET WHEN BIT 16 AND THE RLBA ARE SET. THE RLBA AND BIT 16 ARE CHECKED TO GO TO ZERO.

TEST 14 - READ NPR INTEGRITY
****

THIS TEST WILL VERIFY THAT THE READ FUNCTION WILL NOT CAUSE A BUS TRAP THEREFORE VERIFYING THE NPR LOGIC BETWEEN THE CONTROLLER AND PROCESSOR.

TEST 13 - READ FUNCTION
****

THIS TEST WILL VERIFY THAT THE READ FUNCTION WILL RESET CONTROLLER READY AND POST NO ERRORS.

TEST 14 - READ FUNCTION INTERRUPT
****

THIS TEST WILL VERIFY THAT THE READ FUNCTION WILL GENERATE AN INTERRUPT ON COMPLETION.

TEST 15 - CHECK DIRECTION OF READ NPR
****

THIS TEST WILL VERIFY THAT THE NPR DIRECTION OF A READ FUNCTION IS FROM CONTROLLER TO THE MEMORY. THIS IS DONE BY WRITING A PATTERN IN MEMORY AND ISSUING A READ, THEN CHECKING MEMORY TO VERIFY THAT IT DID NOT GET DISTURBED.

TEST 16 - PROPER INCREMENT OF RLBA ON READ
****

THIS TEST WILL VERIFY THAT THE BUS ADDRESS REGISTER INCREMENTS PROPERLY ON A READ FUNCTION.

TEST 17 - PROPER INCREMENT OF RLDA ON READ
****

THIS TEST WILL VERIFY THAT THE DISK ADDRESS REGISTER INCREMENTS PROPERLY ON A READ FUNCTION.

TEST 18 - FORCE HEADER NOT FOUND WITH READ
****

THIS TEST WILL FORCE A HEADER NOT FOUND ERROR ON A READ. THE RLDA IS SET UP TO LOOK FOR SECTOR 40, A READ IS THEN ISSUED. THE HEADER NOT FOUND ERROR SHOULD THEN SET.

TEST 19 - FORCE HEADER NOT FOUND WITH READ INTERRUPT
****

THIS TEST WILL FORCE A HEADER NOT FOUND ERROR UNDER INTERRUPT CONTROL. HEADER NOT FOUND IS FORCED BY SETTING SECTOR 40 OF RLDA AND ISSUING A READ.

TEST 20 - CHECK HEADER COMPARE LOGIC
****

THIS TEST WILL EXTENSIVELY CHECK THE CYLINDER AND HEAD BITS OF THE HEADER WORD TO COMPARE CORRECTLY. THIS IS DONE BY WALKING AND GROWING 0'S AND 1'S THRU THE PROPER RLDA BITS AND ISSUING READ TO SEE IF ALL BIT POSITIONS CAN COMPARE.

TEST 21 - MULTIPLE SECTOR TRANSFER ON READ
****

THIS TEST THE ABILITY FOR THE READ FUNCTION TO WRITE MORE THAN ONE SECTOR. WE SET UP FOR A TWO SECTOR READ.

TEST 22 - FORCE HNF AT END OF TRACK
****

THIS TEST WILL CHECK THE ABILITY TO DETECT HEADER NOT FOUND AT THE END OF A TRACK. THIS DONE BY SETTING UP FOR A TWO SECTOR READ AT SECTOR 39.

TEST 23 - FORCE NON-EXISTENT MEMORY ERROR
****

THIS TEST WILL CHECK THAT THE NON-EXISTANT MEMORY ERROR (NXM) CAN SET. WE WILL ISSUE A READ TO THE MAXIMUM ADDRESS AND EXPECT A NXM ERROR. (THIS TEST WILL NOT BE DONE ON A 128K MACHINE.)

TEST 24 - FORCE NXM UNDER INTERRUPT
****

THIS TEST WILL ATTEMPT TO FORCE AN INTERRUPT VIA NXM. (THIS TEST WILL NOT BE DONE ONA 128K MACHINE.)

TEST 25 - CHECK READ WRITE LOOP
****

THIS TEST WILL WRITE A PATTERN TO SECTOR 0 AND TRY TO RECOVER IT WITH A WRITE.

TEST 26 - CHECK OF SILO LINES
****

THIS TEST WILL CHECK THAT WE CAN WRITE AND READ UNIQUE BIT PATTERNS VERIFY THAT THE LINES ON THE SILO ARE NOT STUCK OR TIED TOGETHER. THIS IS DONE WITH WALKING AND GROWING 0'S AND 1'S.

TEST 27 - CHECK THROUGHPUT OF SILO
****

THIS TEST WILL ATTEMPT TO CHECK THAT THE FALL THROUGH OF THE SILO IS WORKING CORRECTLY. WE WRITE A SECTOR OF 128 UNIQUE PATTERNS AND READ IT BACK CHECKING THAT EACH LOCATION IS UNIQUE AND CORRECT.

TEST 28 - CHECK ZERO FILL ON WRITE
****

THIS TEST WILL CHECK THE ABILITY OF THE CONTROLLER TO FILL THE REMAINING SECTOR WITH ZEROS ON A WRITE. WE WRITE A SECTOR WITH FROM 1 TO 127 WORDS, READ IT BACK AND VERIFY THAT THE NON WRITTEN WORDS ARE ZERO.

TEST 29 - CHECK SECTOR BITS ON HEADER COMPARE
****

THIS TEST WILL CHECK THAT THE SECTOR BITS CAN COMPARE CORRECTLY. THIS IS DONE BY WRITING THE SECTORS ADDRESS INTO THE SECTOR FOR A FULL TRACK. EACH SECTOR IS READ TO VERIFY THE SECTOR HAS THE CORRECT DATA, IF NOT THEN THE SECTOR BITS ARE NOT COMPARING CORRECTLY.

TEST 30 - WRITE CHECK NPR INTEGRITY
****

THIS TEST WILL CHECK THAT THE WRITE CHECK WILL FUNCTION WITHOUT CAUSING A BUS TRAP. TEST IS SET UP TO HANDLE BUS TRAPS.

```
TEST 31 - WRITE CHECK FUNCTION
*******

          THIS TEST WILL CHECK THAT A WRITE CHECK FUNCTION WILL COMPLETE
          WITH THE SPECIFIED TIME WITHOUT POSTING ERRORS.

TEST 32 - WRITE CHECK FUNCTION INTERRUPT
*******

          THIS TEST WILL CHECK THAT AN INTERRUPT CAN BE GENERATED FROM
          ISSUING A WRITE CHECK.

TEST 33 - PROPER INCREMENT OF RLBA ON WRITE CHECK
*******

          THIS TEST WILL CHECK THAT THE RLBA INCREMENTS PROPERLY DURING A
          WRITE CHECK.

TEST 34 - PROPER INCREMENT OF RLDA ON WRITE CHECK
*******

          THIS TEST WILL CHECK THAT THE RLDA INCREMENTS PROPERLY DURING A
          WRITE CHECK.

TEST 35 - MULTIPLE SECTOR WRITE CHECK
*******

          THIS TEST WILL CHECK THAT WE CAN WRITE CHECK MORE THAN ONE SECTOR
          AT A TIME.

TEST 36 - FORCE DCK WITH WRITE CHECK
*******

          THIS TEST WILL CHECK THAT WE CAN DETECT A DCK DURING A WRITE
          CHECK.  THIS IS DONE BY MODIFYING MEMORY BETWEEN A WRITE AND A
          WRITE CHECK.

TEST 37 - FORCE DCK WITH WRITE CHECK INTERRUPT
*******

          THIS TEST WILL CHECK THAT A DCK DURING A WRITE CHECK WILL CAUSE
          AN INTERRUPT TO OCCUR.
```

```
TEST 38 - CHECK ZERO FILL ON WRITE WITH WRITE CHECK
*******

        THIS TEST WILL VERIFY THAT WE CAN SUCCESSFULLY WRITE CHECK ALL
        WORD COUNTS FROM 1 - 127.


TEST 39 - EXTENDED CHECK OF WRITE CHECK
*******

        THIS TEST WILL VERIFY THAT WE CAN WRITE CHECK SUCCESSFULLY
        ALL PATTERNS.  PATTERNS USED ARE WALKING 1'S, 0'S, GROWING 1'S, 0'S.


TEST 40 - READ WITHOUT HEADER COMPARE
*******

        THIS TEST VERIFIES THAT THE FUNCTION READ WITHOUT HEADER COMPARE
        (7) RESETS THE CONTROLLER READY AND POSTS NO ERRORS.  THE DISK
        ADDRESS IS SET TO ALL ONES.


TEST 41 - READ WITHOUT HEADER COMPARE INTERRUPT
*******

        THIS TEST WILL VERIFY THAT THE FUNCTION READ WITHOUT HEADER
        COMPARE (7) CAN GENERATE AN INTERRUPT ON COMPLETION.


TEST 42 - CHECK RD W/O HDR CMP READS
*******

        THIS TEST CHECKS THAT THE FUNCTION CAN ACTUALLY RECOVER DATA.
        WE WRITE A PATTERN IN MEMORY AND CHECK THAT THE FUNCTION CAN
        OVERLAY IT WITH DATA.


TEST 43 - CHECK RLBA INCREMENT WITH RD W/O HDR CMP
*******

        THIS TEST CHECKS THAT THE RLBA CAN INCREMENT PROPERLY ON THE
        FUNCTION.


TEST 44 - CHECK RLDA DOES INCREMENT
*******

        THIS TEST CHECKS THAT THE RLDA DOES INCREMENT WITH THE
        FUNCTION READ WITHOUT HEADER COMPARE.

@
```

```

                                .TITLE  CZRLHBO RL11/RLV11 CTLR TST 2
                                .ENABLE AMA
                                .ENABLE ABS
                                .MCALL SVC
            002000              .=2000

                                .SBTTL  MACRO DEFINITIONS

                                .MACRO  CKERFG
                                        TST     ERFLG           ;ERROR IN HEADS HOME ROUTINE
                                        BEQ     123$            ;NO, THEN CONTINUE
                                        EXIT    TST             ;YES, EXIT TEST
                                123$:                           ;CONTINUE WITH TEST
                                .ENDM

                                .MACRO  WAITUS  ARG             ;MACRO MICRO-SEC WAIT
                                        MOV     ARG,XDELAY      ;SAVE ARGUMENT
                                        JSR     PC,TIME         ;CALL TIMING ROUTINE
                                .ENDM

                                .MACRO  WAITMS  ARG             ;MACRO MILLISEC WAIT
                                        MOV     ARG,YDELAY      ;SAVE ARGUMENT
                                        JSR     PC,XTIME        ;CALL TIMING ROUTINE
                                .ENDM


                                .NLIST  CND,MD,ME


    002000                      SVC
            000000              SVCINS=0
            000000              SVCTAG=0


    002000                              POINTER BGNSW,BGNSFT,BGNDU

    002000                      BGNMOD  MDHEDR

    002000                              HEADER  CZRLH,B,0,60,0
(4) 002000     103                      .ASCII /C/
(4) 002001     132                      .ASCII /Z/
(4) 002002     122                      .ASCII /R/
(4) 002003     114                      .ASCII /L/
(4) 002004     110                      .ASCII /H/
(6) 002005     000                      .BYTE   0
(6) 002006     000                      .BYTE   0
(5) 002007     000                      .BYTE   0
(4) 002010     102                      .ASCII  /B/
(4) 002011     060                      .ASCII  /0/
(4) 002012  000000                      .WORD   0
(4) 002014  000060                      .WORD   60
(4) 002016  033604                      .WORD   L$HARD
(4) 002020  033760                      .WORD   L$SOFT
(4) 002022  012416                      .WORD   L$HW
(4) 002024  012434                      .WORD   L$SW
```

```
   (4)  002026  034152                                      .WORD   L$LAST
   (4)  002030  000000                                      .WORD   0
   (4)  002032  000000                                      .WORD   0
   (4)  002034  000000                                      .WORD   0
   (4)  002036  000000                                      .WORD   0
   (4)  002040  012450                                      .WORD   L$DISPATCH
   (4)  002042  000000                                      .WORD   0
   (4)  002044  000000                                      .WORD   0
   (4)  002046  000000                                      .WORD   0
   (4)  002050     003                                      .BYTE   C$REVISION
   (3)  002051     003                                      .BYTE   C$EDIT
   (4)  002052  000000                                      .WORD   0
   (5)  002054  000000                                      .WORD   0
   (4)  002056  000000                                      .WORD   0
   (4)  002060  002220                                      .WORD   L$DVTYP
   (4)  002062  000000                                      .WORD   0
   (4)  002064  000000                                      .WORD   0
   (4)  002066  000000                                      .WORD   0
   (4)  002070  000000                                      .WORD   0
   (4)  002072  013562                                      .WORD   L$DU
   (4)  002074  000000                                      .WORD   0
   (4)  002076  002122                                      .WORD   L$DESC
   (4)  002100  104035                                      EMT     E$LOAD
   (4)  002102  000000                                      .WORD   0
   (4)  002104  012600                                      .WORD   L$INIT
   (4)  002106  013466                                      .WORD   L$CLEAN
   (4)  002110  013300                                      .WORD   L$AUTO
   (4)  002112  012406                                      .WORD   L$PROT
   (4)  002114  000000                                      .WORD   0
   (4)  002116  000000                                      .WORD   0
   (4)  002120  000000                                      .WORD   0

        002122                                  ENDMOD

        002122                                          DESCRIPT        <CZRLH TESTS WRITE DATA, READ DATA, AND WRITE CHECK OPERATIONS>
   (3)  002122  055103  046122  020110                  .ASCIZ  /CZRLH TESTS WRITE DATA, READ DATA, AND WRITE CHECK OPERATIONS/
   (3)  002130  042524  052123  020123
   (3)  002136  051127  052111  020105
   (3)  002144  040504  040524  020054
   (3)  002152  042522  042101  042040
   (3)  002160  052101  026101  040440
   (3)  002166  042116  053440  044522
   (3)  002174  042524  041440  042510
   (3)  002202  045503  047440  042520
   (3)  002210  040522  044524  047117
   (3)  002216  000123
   (2)                                                  .EVEN

        002220                                          DEVTYP  <RL01,RL02>
   (3)  002220  046122  030460  051054                  .ASCIZ  /RL01,RL02/
   (3)  002226  030114  000062
   (2)                                                  .EVEN



```

```
     51                              .SBTTL  GLOBAL EQUATES
     52
     53  002232                      BGNMOD  GLBEQAT
     54  002232                              EQUALS
    (1)                              ;
    (1)                              ; BIT DIFINITIONS
    (1)                              ;
    (1)          100000              BIT15== 100000
    (1)          040000              BIT14== 40000
    (1)          020000              BIT13== 20000
    (1)          010000              BIT12== 10000
    (1)          004000              BIT11== 4000
    (1)          002000              BIT10== 2000
    (1)          001000              BIT09== 1000
    (1)          000400              BIT08== 400
    (1)          000200              BIT07== 200
    (1)          000100              BIT06== 100
    (1)          000040              BIT05== 40
    (1)          000020              BIT04== 20
    (1)          000010              BIT03== 10
    (1)          000004              BIT02== 4
    (1)          000002              BIT01== 2
    (1)          000001              BIT00== 1
    (1)                              ;
    (1)          001000              BIT9==  BIT09
    (1)          000400              BIT8==  BIT08
    (1)          000200              BIT7==  BIT07
    (1)          000100              BIT6==  BIT06
    (1)          000040              BIT5==  BIT05
    (1)          000020              BIT4==  BIT04
    (1)          000010              BIT3==  BIT03
    (1)          000004              BIT2==  BIT02
    (1)          000002              BIT1==  BIT01
    (1)          000001              BIT0==  BIT00
    (1)                              ;
    (1)                              ; EVENT FLAG DEFINITIONS
    (1)                              ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
    (1)                              ;
    (1)          000040              EF.START==        32.                         ; START COMMAND WAS ISSUED
    (1)          000037              EF.RESTART==      31.                         ; RESTART COMMAND WAS ISSUED
    (1)          000036              EF.CONTINUE==     30.                         ; CONTINUE COMMAND WAS ISSUED
    (1)          000035              EF.NEW==          29.                         ; A NEW PASS HAS BEEN STARTED
    (1)          000034              EF.PWR==          28.                         ; A POWER-FAIL/POWER-UP OCCURRED
    (1)                              ;
    (1)                              ;
    (1)                              ; PRIORITY LEVEL DEFINITIONS
    (1)                              ;
    (1)          000340              PRI07== 340
    (1)          000300              PRI06== 300
    (1)          000240              PRI05== 240
    (1)          000200              PRI04== 200
    (1)          000140              PRI03== 140
    (1)          000100              PRI02== 100
    (1)          000040              PRI01== 40
    (1)          000000              PRI00== 0
    (1)                              ;
```

```
(1)                       ;OPERATOR FLAG BITS
(1)                       ;
(1)       000004          EVL==        4
(1)       000010          LOT==       10
(1)       000020          ADR==       20
(1)       000040          IDU==       40
(1)       000100          ISR==      100
(1)       000200          UAM==      200
(1)       000400          BOE==      400
(1)       001000          PNT==     1000
(1)       002000          PRI==     2000
(1)       004000          IXE==     4000
(1)       010000          IBE==    10000
(1)       020000          IER==    20000
(1)       040000          LOE==    40000
(1)       100000          HOE==   100000
          000001          DRDY=BIT0                    ;DRIVE READY (RLCS)
          000100          INTEN=BIT6                   ;INTERRUPT ENABLE (RLCS)
          100000          ERR=BIT15                    ;RL11 ERROR (RLCS)
          040000          DERR=BIT14                   ;RL01 DRIVE ERROR (RLCS)
          002000          OPI=BIT10                    ;OPERATION INCOMPLETE (RLCS)
          000200          CRDY=BIT7                    ;CONTROLLER READY (RLCS)
          000040          BA17=BIT5                    ;EXTENDED ADDRESS BIT 17 (RLCS)
          000020          BA16=BIT4                    ;EXTENDED ADDRESS BIT 16 (RLCS)
          020000          NXM=BIT13                    ;NON-EXISTANT MEMORY (RLCS)
          000000          DS0=0                        ;DRIVE SELECT 0 (RLCS)
          000400          DS1=BIT8                     ;DRIVE SELECT 1 (RLCS)
          001000          DS2=BIT9                     ;DRIVE SELECT 2 (RLCS)
          001400          DS3=BIT8!BIT9                ;DRIVE SELECT 3 (RLCS)
          000000          NOOP0=0                      ;FUNCTION-NOOP(0)
          000002          WRCHK=BIT1                   ;WRITE CHECK FUNCTION
          000004          GSTAT=BIT2                   ;GET STATUS FUNCTION
          000006          SEEK=BIT2!BIT1               ;SEEK FUNCTION
          000010          RDHDR=BIT3                   ;READ HEADER FUNCTION
          000012          WRITE=BIT3!BIT1              ;WRITE DATA FUNCTION
          000014          READ=BIT3!BIT2               ;READ DATA FUNCTION
          000016          RDNHD=BIT3!BIT2!BIT1         ;READ W/O HEADER VERIFICATION
          000202          GODRVR=BIT1!BIT7             ;CRDY AND DRDY
          000010          DRST=BIT3                    ;DRIVE RESET (RLDA)
          000002          GSBIT=BIT1                   ;GET STATUS BIT (RLDA)
          000001          MK=BIT0                      ;MARKER BIT (RLDA)
          000004          SIGN=BIT2                    ;SIGN BIT (RLDA)
          000100          RHHS=BIT6                    ;HEAD SELECT IN READ HEADER
          000100          STHS=BIT6                    ;HEAD SELECT IN STATUS BACK
          000020          DAHS=BIT4                    ;HEAD SELECT IN SEEK

                          ;OFFSET FOR HARDWARE P-TABLE

          000000          CSR=0
          000002          VECT=2
          000004          PRIOR=4
          000006          TYPDR=6
          000010          DRBT=10
          000012          CNT=12

                          ;OFFSET FOR SOFTWARE P-TABLE
```

```

        000000                  DLT=0
        000002                  ELT=2
        000004                  SIZE=4
        000006                  DMPCK=6
        000010                  DLMT=10
        000012                  ANS=12

002232                          ENDMOD


                                .SBTTL  GLOBAL DATA

002232                          BGNMOD  GLBDAT

002232  000000                  T.DRIVE: .WORD  0
002234  000000                  CHECK:   .WORD  0
002236  000000                  T.CRC:   .WORD  0
002240  000000                  WHY:     .WORD  0
002242  000000                  CDCNT:   .WORD  0
002244  000004                  ERRVEC:  .WORD  4
002246  000000                  DRIVE:   .WORD  0
002250  000000                  UUT:     .WORD  0
002252  000000                  UNITST:  .WORD  0
002254  000000                  TRPFLG:  .WORD  0
002256  000000                  INTFLG:  .WORD  0                       ;INTERRUPT OCCURANCE FLAG
002260  000000                  LDCSR:   .WORD  0                       ;LOCATION TO FORM RLCS
002262  000077                  SECMSK:  .WORD  77                      ;MASK OUT SECTOR
002264  120001                  XPOLY:   .WORD  120001                  ;POLYNOMIAL FOR CRC 16
002266  000000                  BCCFBK:  .WORD  0                       ;LOCATION USED BY "SIMBCC"
002270  000000                  CALBCC:  .WORD  0                       ;LOCATION USED BY "SIMBCC"
002272  000000                  TMP0:    .WORD  0
002274  000000                  TMP1:    .WORD  0
002276  000000                  TMP2:    .WORD  0
002300  000000                  GDDAT:   .WORD  0
002302  000000                  BDDAT:   .WORD  0
002304  000000                  TEMP2:   .WORD  0                       ;LOCATION USED BY "SIMBCC"
002306  000000                  TEMP3:   .WORD  0                       ;LOCATION USED BY "SIMBCC"
002310  000000                  TEMP4:   .WORD  0                       ;LOCATION USED BY "SIMBCC"
002312  000000                  FIRST:   .WORD  0                       ;FIRST SECTOR READ
002314  177700                  CYLMSK:  .WORD  177700                  ;MASK CYLINDER AND HEAD SELECT
002316  000050                  MXSEC1:  .WORD  40.                     ;MAX SECTOR ADDRESS +1
002320  000047                  MAXSEC:  .WORD  39.                     ;MAX SECTOR ADDRESS
002322  000000                  DWORD:   .WORD  0                       ;DIFFERENCE WORD (SEEK)
002324  177600                  MAXCYL:  .WORD  177600                  ;MAXIMUM CYLINDER ADDRESS
002326  000000                  SVHD:    .WORD  0                       ;SAVE CURRENT HEAD SELECT
002330  000000                  B.CS:    .WORD  0                       ;CS - BEFORE OPERATION
002332  000000                  B.BA:    .WORD  0                       ;BA - BEFORE OPERATION
002334  000000                  B.DA:    .WORD  0                       ;DA - BEFORE OPERATION
002336  000000                  B.MP:    .WORD  0                       ;MP - BEFORE OPERATION
002340  000000                  E.CS:    .WORD  0                       ;CS - AT OCCURANCE OF ERROR
002342  000000                  E.BA:    .WORD  0                       ;BA - AT OCCURANCE OF ERROR
002344  000000                  E.DA:    .WORD  0                       ;DA - AT OCCURANCE OF ERROR
002346  000000                  E.MP:    .WORD  0                       ;MP - AT OCCURANCE OF ERROR
002350  000000                  E.MP1:   .WORD  0
002352  000000                  E.MP2:   .WORD  0
```

```
002354  000000          RLCS:   .WORD   0
002356  000000          RLBA:   .WORD   0
002360  000000          RLDA:   .WORD   0
002362  000000          RLMP:   .WORD   0
002364  000000          BCSR:   .WORD   0                       ;CSR FROM P-TABLE
002366  000000          BVEC:   .WORD   0                       ;VECTOR FROM P-TABLE
002370  000000          BPRIOR: .WORD   0                       ;BR LEVEL FROM P-TABLE
002372  000000          FNDFNC: .WORD   0
002374  000000          XMEM:   .WORD   0
002376  000000          TRYFNC: .WORD   0                       ;
002400  000000          ERFLG:  .WORD   0
002402  001212          LOPIMX: .WORD   650.
002404  000233          LOPIMN: .WORD   155.
002406  000620          UOPIMX: .WORD   400.
002410  000240          UOPIMN: .WORD   160.
002412  000000          OPIMN:  .WORD   0
002414  000000          OPIMX:  .WORD   0
002416  000000          PWRFLG: .WORD   0
002420  000000          T.CNTLR:  .WORD 0
002422  000000          DERFLG: .WORD   0
002424  000000          ERPOINT:  .WORD 0
002426  000100          ERCOUNT:  .BLKW 64.
002626  000000          XDELAY: .WORD   0
002630  000000          YDELAY: .WORD   0
002632  000000          TEMP0:  .WORD   0
002634  000000          TEMP:   .WORD   0
002636  000000          TIM.US: .WORD   0
002640  000000          TAG:    .WORD   0
002642  000000          PCLKCS: .WORD   0
002644  000000          PCSR:   .WORD   0
002646  000000          VEC:    .WORD   0
002650  000000          HZ:     .WORD   0
002652  000000          XITFLG: .WORD   0
002654  000000          FIFTY:  .WORD   0
002656  000000          SIXTY:  .WORD   0
002660  000000          PCLOCK: .WORD   0
002662  000000          NOTST:  .WORD   0
002664  000000          OPITIM: .WORD   0
002666  000000          CLKFLD: .WORD   0                       ;CLOCK FIELD USED TO CHECK IF LSI-11 CLOCK
                                                                ;/IS ''TICKING''



                        .SBTTL  LIST TO CHECK HEADER COMPARE LOGIC
002670  000000          HDRTAB: .WORD   0                       ;WALK 1
002672  000001                  .WORD   BIT0
002674  000002                  .WORD   BIT1
002676  000004                  .WORD   BIT2
002700  000010                  .WORD   BIT3
002702  000020                  .WORD   BIT4
002704  000040                  .WORD   BIT5
002706  000100                  .WORD   BIT6
002710  000200                  .WORD   BIT7
002712  000400                  .WORD   BIT8
002714  001000                  .WORD   BIT9
002716  002000                  .WORD   BIT10
002720  004000                  .WORD   BIT11
```

```
002722  010000                          .WORD   BIT12
002724  020000                          .WORD   BIT13
002726  040000                          .WORD   BIT14
002730  000003                          .WORD   3               ;GROW 1
002732  000007                          .WORD   7
002734  000017                          .WORD   17
002736  000037                          .WORD   37
002740  000137                          .WORD   137
002742  000337                          .WORD   337
002744  000737                          .WORD   737
002746  001737                          .WORD   1737
002750  003737                          .WORD   3737
002752  007737                          .WORD   7737
002754  017737                          .WORD   17737
002756  037737                          .WORD   37737
002760  077737                          .WORD   77737
002762  077736                          .WORD   77736           ;GROW 0
002764  077734                          .WORD   77734
002766  077730                          .WORD   77730
002770  077720                          .WORD   77720
002772  077700                          .WORD   77700
002774  077600                          .WORD   77600
002776  077400                          .WORD   77400
003000  077000                          .WORD   77000
003002  076000                          .WORD   76000
003004  074000                          .WORD   74000
003006  070000                          .WORD   70000
003010  060000                          .WORD   60000
003012  040000                          .WORD   40000
003014  077735                          .WORD   77735           ;WALK 0
003016  077733                          .WORD   77733
003020  077727                          .WORD   77727
003022  077717                          .WORD   77717
003024  077637                          .WORD   77637
003026  077537                          .WORD   77537
003030  077337                          .WORD   77337
003032  076737                          .WORD   76737
003034  075737                          .WORD   75737
003036  073737                          .WORD   73737
003040  067737                          .WORD   67737
003042  057737                          .WORD   57737
003044  037737                          .WORD   37737
003046  000000                  HDREND: .WORD   0
003050  000000                  HTAB:   .WORD   0               ;WALK 1
003052  000001                          .WORD   BIT0
003054  000002                          .WORD   BIT1
003056  000004                          .WORD   BIT2
003060  000010                          .WORD   BIT3
003062  000020                          .WORD   BIT4
003064  000040                          .WORD   BIT5
003066  000100                          .WORD   BIT6
003070  000200                          .WORD   BIT7
003072  000400                          .WORD   BIT8
003074  001000                          .WORD   BIT9
003076  002000                          .WORD   BIT10
003100  004000                          .WORD   BIT11
```

```
003102  010000                                    .WORD   BIT12
003104  020000                                    .WORD   BIT13
003106  040000                                    .WORD   BIT14
003110  100000                                    .WORD   BIT15
003112  000003                                    .WORD   3                     ;GROW 1
003114  000007                                    .WORD   7
003116  000017                                    .WORD   17
003120  000037                                    .WORD   37
003122  000137                                    .WORD   137
003124  000337                                    .WORD   337
003126  000737                                    .WORD   737
003130  001737                                    .WORD   1737
003132  003737                                    .WORD   3737
003134  007737                                    .WORD   7737
003136  017737                                    .WORD   17737
003140  037737                                    .WORD   37737
003142  077737                                    .WORD   77737
003144  177737                                    .WORD   177737
003146  177736                                    .WORD   177736                ;GROW 0
003150  177734                                    .WORD   177734
003152  177730                                    .WORD   177730
003154  177720                                    .WORD   177720
003156  177700                                    .WORD   177700
003160  177600                                    .WORD   177600
003162  177400                                    .WORD   177400
003164  177000                                    .WORD   177000
003166  176000                                    .WORD   176000
003170  174000                                    .WORD   174000
003172  170000                                    .WORD   170000
003174  160000                                    .WORD   160000
003176  140000                                    .WORD   140000
003200  100000                                    .WORD   100000
003202  177735                                    .WORD   177735                ;WALK 0
003204  177733                                    .WORD   177733
003206  177727                                    .WORD   177727
003210  177717                                    .WORD   177717
003212  177637                                    .WORD   177637
003214  177537                                    .WORD   177537
003216  177337                                    .WORD   177337
003220  176737                                    .WORD   176737
003222  175737                                    .WORD   175737
003224  173737                                    .WORD   173737
003226  167737                                    .WORD   167737
003230  157737                                    .WORD   157737
003232  137737                                    .WORD   137737
003234  000000                          HEND:     .WORD   0



003236  000001  000002  000004  DATPAT:  .WORD   1,2,4,10,20,40,100,200,400,1000,2000,4000,10000,20000,40000,100000
003244  000010  000020  000040
003252  000100  000200  000400
003260  001000  002000  004000
003266  01000C  020000  040000
003274  100000
003276  177777  177776  177775           .WORD   177777,177776,177775,177773,177767,177757,177737,177677
```

```
003304  177773  177767  177757
003312  177737  177677
003316  177577  177377  176777           .WORD   177577,177377,176777,175777,173777,167777,157777,137777
003324  175777  173777  167777
003332  157777  137777
003336  077777  177774  177770           .WORD   77777,177774,177770,177760,177740,177700,177600,177400
003344  177760  177740  177700
003352  177600  177400
003356  177000  176000  174000           .WORD   177000,176000,174000,170000,160000,140000,3,7,17,37,77
003364  170000  160000  140000
003372  000003  000007  000017
003400  000037  000077
003404  000177  000377  000777           .WORD   177,377,777,1777,3777,7777,17777,37777,0
003412  001777  003777  007777
003420  017777  037777  000000



003426  000400                  BUF:     256.                           ;BUFFER FOR READ/WRITE


003430                          ENDMOD

                                .SBTTL   GLOBAL TEXT

003430                          BGNMOD   GLBTXT
003430  051503  020072     000  ARLCS:   .ASCIZ  /CS: /
003435     040  040502  020072  ARLBA:   .ASCIZ  / BA: /
003443     040  040504  020072  ARLDA:   .ASCIZ  / DA: /
003451     040  050115  020072  ARLMP:   .ASCIZ  / MP: /
003457     102  043105  051117  BEREG:   .ASCIZ  /BEFORE COMMAND: /
003500  044524  042515  047440  AFREG:   .ASCIZ  /TIME OF ERROR:  /
003521     103  047117  051124  CRTIM:   .ASCIZ  /CONTROLLER TIMED OUT/
003546  051104  053111  020105  DRTIM:   .ASCIZ  /DRIVE READY TIMED OUT/
003574  042040  053122     000  DEMES:   .ASCIZ  / DRV/
003601     040  054116  000115  NXMMES:  .ASCIZ  / NXM/
003606  047440  044520     000  OPIMES:  .ASCIZ  / OPI/
003613     040  041510  041522  HCRCMES:.ASCIZ   / HCRC/
003621     040  047110  000106  HNFMES:  .ASCIZ  / HNF/
003626  042040  045503     000  DCKMES:  .ASCIZ  / DCK/
003633     040  046104  000124  DLTMES:  .ASCIZ  / DLT/
003640  000015                  LF:      .ASCIZ  <15>
003642  005015     000          MSCRLF:  .ASCIZ  <15><12>
003645     040  047503  050115  COMP:    .ASCIZ  / COMP/
003653     106  041522  020104  OPIERR:  .ASCIZ  /FRCD OPI C'SED OTHER ERRS/
003705     116  047517  020120  NOPMES:  .ASCIZ  /NOOP OPR'TN-FLAG MODE/
003733     116  047517  020120  NOPINT:  .ASCIZ  /NOOP OPR'TN-INTR. MODE/
003762  051127  052111  020105  WCKMES:  .ASCIZ  /WRITE CHCK OPR'TN-FLAG MODE/
004016  051127  052111  020105  WCKINT:  .ASCIZ  /WRITE CHCK OPR'TN-INTR. MODE/
004053     122  020104  042110  RHDMES:  .ASCIZ  /RD HDR OPR'TN-FLAG MODE/
004103     122  020104  042110  RHDINT:  .ASCIZ  /RD HDR OP-INTR. MODE/
004130  045523  047440  026520  SEKMES:  .ASCIZ  /SK OP-FLAG MODE/
004150  045523  047440  026520  SEKINT:  .ASCIZ  /SK OP-INTR. MODE/
004171     107  052105  051440  GSTMES:  .ASCIZ  /GET STATUS OP-FLAG MODE/
004221     107  052105  051440  GSTINT:  .ASCIZ  /GET STATUS OP-INTR MODE/
004251     122  020104  050117  RDDMES:  .ASCIZ  /RD OP-FLAG MODE/
```

```
004271     122 020104 050117 RDDINT: .ASCIZ  /RD OP-INTR MODE/
004311     127 052122 047440 WRTMES: .ASCIZ  /WRT OP-FLAG MODE/
004332  051127 020124 050117 WRTINT: .ASCIZ  /WRT OP-INTR MODE/
004353     122 020104 027527 RDNMES: .ASCIZ  %RD W/O HDR - FLG MODE%
004401     122 020104 027527 RDNINT: .ASCIZ  %RD W/O HDR - INTR MODE%
004430  040503 023516 020124 SKHOME: .ASCIZ  /CAN'T SK TO TRK 0/
004452  051127 020124 047514 WRLOCK: .ASCIZ  /WRT LOCK ERR/
004467     122 041514 020123 EM1:    .ASCIZ  /RLCS HAD FOLLOWING ERR(S):/
004522  000170               EM100:  .BLKB   120.
004712  047516 044440 052116 EM4:    .ASCIZ  /NO INTRPT ON RD OP/
004735     122 020104 050117 EM5:    .ASCIZ  /RD OP DID NOT WRT MEM/
004763     122 041114 020101 EM6:    .ASCIZ  /RLBA DID NOT INCR DURING RD/
005017     123 041505 051124 EM7:    .ASCIZ  /SECTR DID NOT INCR PROPERLY AFTER RD/
005064  042110 020122 047516 EM10:   .ASCIZ  /HDR NOT FND COULD NOT BE FORCED/
005124  051127 047117 020107 EM11:   .ASCIZ  /WRONG CYL ON SK/
005144  042110 020122 047516 EM12:   .ASCIZ  /HDR NOT FND WOULD NOT SET/
005176  051104 020126 042122 EM13:   .ASCIZ  /DRV RDY WOULD NOT SET/
005224  051504 020113 042101 EM14:   .ASCIZ  /DSK ADDR INCORRECT AFTER MULTIPLE SCTR READ/
005300  051104 020126 051105 EM16:   .ASCIZ  /DRV ERR ON WRT OP/
005322  047516 044440 052116 EM17:   .ASCIZ  /NO INTRPT ON WRT OP/
005346  046122 040502 042040 EM20:   .ASCIZ  /RLBA DID NOT INCR PROPERLY DURING WRT/
005414  041523 051124 042040 EM21:   .ASCIZ  /SCTR DID NOT INCR PROPERLY AFTER WRT/
005461     104 045523 040440 EM22:   .ASCIZ  /DSK ADDR (RLDA) INCORRECT AFT MUL'PLE SCTR WRT/
005540  042110 020122 047516 EM23:   .ASCIZ  /HDR NOT FND COULD NOT BE FORCED AT END OF TRK/
005616  054116 020115 042515 EM24:   .ASCIZ  /NXM MEM ERR COULD NOT BE FORCED/
005656  040504 040524 041440 EM25:   .ASCIZ  %DATA CMP ERR - RD/WRT ERR%
005710  051127 020124 050117 EM26:   .ASCIZ  /WRT OP MODIFIED MEM/
005734  051105 020122 047117 EM27:   .ASCIZ  /ERR ON PARTIAL SCTR WRT - ZERO FILL CHCK/
006005     122 041114 020101 EM30:   .ASCIZ  /RLBA DID NOT INCR PROPERLY/
006040  040502 041040 052111 EM31:   .ASCIZ  /BA BIT 16 DID NOT SET ON INCR/
006076  040502 041040 052111 EM32:   .ASCIZ  /BA BIT 17 SET ON BA16 INCR TST/
006135     122 041114 020101 EM33:   .ASCIZ  /RLBA DID NOT INCR WITH BA16/
006171     102 020101 044502 EM34:   .ASCIZ  /BA BIT 17 DID NOT SET ON INCR/
006227     102 020101 044502 EM35:   .ASCIZ  /BA BIT 16 DID NOT CLR ON INCR/
006265     122 041114 020101 EM36:   .ASCIZ  /RLBA DID NOT INCR WITH BA17/
006321     122 040505 024104 EM40:   .ASCIZ  /READ(FUNCTION 7) DID NOT INTRPT/
006361     122 024104 052506 EM41:   .ASCIZ  /RD(FUNCTION 7) ERR - BAD DATA/
006417     122 020104 043050 EM42:   .ASCIZ  /RD (FUNCTION 7) ERR AT END OF TRK/
006461     116 020117 047111 EM43:   .ASCIZ  /NO INTRPT WITH HDR NT FND FORCED/
006522  047516 044440 052116 EM44:   .ASCIZ  /NO INTRPT WITH NXM FORCED/
006554  051105 020122 047117 EM45:   .ASCIZ  %ERR ON BIT BANG OF SILO%
006604  044523 047514 047440 EM47:   .ASCIZ  /SILO OP FAIL/
006621     110 051104 041440 EM50:   .ASCIZ  /HDR CMP FAILURE - SECTOR/
006652  042122 053440 047457 EM55:   .ASCIZ  ?RD W/O HDR CMP OP DID NOT WRT MEMORY?
006717     122 041114 020101 EM53:   .ASCIZ  ?RLBA D'NT INCR DURING RD W/O HDR CMP?
006764  046122 040504 042040 EM54:   .ASCIZ  ?RLDA DID NOT INCR AFTER RD W/O HDR CMP?
007033     117 044520 052040 EM56:   .ASCIZ  /OPI TIMING ERR/
007052  051127 020124 044103 EM57:   .ASCIZ  /WRT CHCK NPR CAUSED BUS TRAP/
007107     127 052122 041440 EM60:   .ASCIZ  /WRT CHCK DID NOT INTRPT/
007137     122 041114 020101 EM61:   .ASCIZ  /RLBA DID NOT INCR PROPERLY DURING WRCHK/
007207     122 042114 020101 EM62:   .ASCIZ  /RLDA DID NOT INCR DURING WRCHK/
007246  046122 040504 042040 EM63:   .ASCIZ  /RLDA DID NOT INCR AFT A MULT' SCTR WRT CHK/
007321     127 052122 041440 EM64:   .ASCIZ  /WRT CHECK OF PARTIAL SCTR WRT FAIL/
007364  040503 047116 052117 EM65:   .ASCIZ  /CANNOT FORCE DCK ON WRT CHCK/
007421     103 047101 047516 EM66:   .ASCIZ  /CANNOT FORCE INTERRUPT WITH DCK ON WRCHK/
007472  051127 020124 044103 EM70:   .ASCIZ  /WRT CHCK FAIL/
```

```


                              .EVEN



     007510                           ENDMOD

     007510                   BGNMOD  GLBERR

                              .SBTTL  GLOBAL ERRORS
     007510                   BGNMSG  ERR0

     007510 004737 010522             JSR     PC,LINE1
     007514 004737 010556             JSR     PC,LINE2


     007520 004537 014530             JSR     R5,CKERLT              ;INCREMENT ERROR AND CHECK LIMIT

     007524                           ENDMSG
 (3) 007524                   L10000:
 (3) 007524 104423                    TRAP    C$MSG

     007526                   BGNMSG  ERR1

     007526 004737 010522             JSR     PC,LINE1


     007532 004537 014530             JSR     R5,CKERLT              ;INCREMENT ERROR AND CHECK LIMIT

     007536                           ENDMSG
 (3) 007536                   L10001:
 (3) 007536 104423                    TRAP    C$MSG

     007540                   BGNMSG  ERR2

     007540 004737 010522             JSR     PC,LINE1
     007544                           PRINTB  #FRMT4,GDDAT,BDDAT
 (9) 007544 013746 002302             MOV     BDDAT,-(SP)
 (8) 007550 013746 002300             MOV     GDDAT,-(SP)
 (7) 007554 012746 011170             MOV     #FRMT4,-(SP)
 (6) 007560 012746 000003             MOV     #3,-(SP)
 (3) 007564 010600                    MOV     SP,R0
 (4) 007566 104414                    TRAP    C$PNTB
 (4) 007570 062706 000010             ADD     #10,SP


     007574 004537 014530             JSR     R5,CKERLT              ;INCREMENT ERROR AND CHECK LIMIT

     007600                           ENDMSG
 (3) 007600                   L10002:
 (3) 007600 104423                    TRAP    C$MSG

     007602                   BGNMSG  ERR3

     007602 004737 010522             JSR     PC,LINE1
 464  007606  004737  010556                   JSR     PC,LINE2
 465  007612                                   PRINTB  #FRMT5,TMPO,BDDAT,GDDAT
(10)  007612  013746  002300                   MOV     GDDAT,-(SP)
 (9)  007616  013746  002302                   MOV     BDDAT,-(SP)
 (8)  007622  013746  002272                   MOV     TMPO,-(SP)
 (7)  007626  012746  011226                   MOV     #FRMT5,-(SP)
 (6)  007632  012746  000004                   MOV     #4,-(SP)
 (3)  007636  010600                           MOV     SP,R0
 (4)  007640  104414                           TRAP    C$PNTB
 (4)  007642  062706  000012                   ADD     #12,SP
 466
 467
 468  007646  004537  014530                   JSR     R5,CKERLT               ;INCREMENT ERROR AND CHECK LIMIT
 469
 470  007652                                   ENDMSG
 (3)  007652                           L10003:
 (3)  007652  104423                           TRAP    C$MSG
 471
 472  007654                           BGNMSG  ERR4
 473
 474  007654  004737  010522                   JSR     PC,LINE1
 475  007660  004737  010556                   JSR     PC,LINE2
 476  007664                                   PRINTB  #FRMT4,GDDAT,BDDAT
 (9)  007664  013746  002302                   MOV     BDDAT,-(SP)
 (8)  007670  013746  002300                   MOV     GDDAT,-(SP)
 (7)  007674  012746  011170                   MOV     #FRMT4,-(SP)
 (6)  007700  012746  000003                   MOV     #3,-(SP)
 (3)  007704  010600                           MOV     SP,R0
 (4)  007706  104414                           TRAP    C$PNTB
 (4)  007710  062706  000010                   ADD     #10,SP
 477
 478
 479  007714  004537  014530                   JSR     R5,CKERLT               ;INCREMENT ERROR AND CHECK LIMIT
 480
 481  007720                                   ENDMSG
 (3)  007720                           L10004:
 (3)  007720  104423                           TRAP    C$MSG
 482
 483  007722                           BGNMSG  ERR5
 484
 485  007722  004737  010522                   JSR     PC,LINE1
 486  007726                                   PRINTB  #FRMT3,RESTMS
 (8)  007726  013746  015040                   MOV     RESTMS,-(SP)
 (7)  007732  012746  011163                   MOV     #FRMT3,-(SP)
 (6)  007736  012746  000002                   MOV     #2,-(SP)
 (3)  007742  010600                           MOV     SP,R0
 (4)  007744  104414                           TRAP    C$PNTB
 (4)  007746  062706  000006                   ADD     #6,SP
 487
 488
 489  007752  004537  014530                   JSR     R5,CKERLT               ;INCREMENT ERROR AND CHECK LIMIT
 490
 491  007756                                   ENDMSG
 (3)  007756                           L10005:
 (3)  007756  104423                           TRAP    C$MSG
 492
```

```
007760                            BGNMSG  ERR6

007760  004737  010522                    JSR     PC,LINE1
007764  004737  011000                    JSR     PC,LINE3
007770  004737  010556                    JSR     PC,LINE2


007774                                    PRINTB  #FRMT99
007774  012746  012106                    MOV     #FRMT99,-(SP)
010000  012746  000001                    MOV     #1,-(SP)
010004  010600                            MOV     SP,R0
010006  104414                            TRAP    C$PNTB
010010  062706  000004                    ADD     #4,SP
010014  004537  014530                    JSR     R5,CKERLT                ;INCREMENT ERROR AND CHECK LIMIT

010020                                    ENDMSG
010020                            L10006:
010020  104423                            TRAP    C$MSG

010022                            BGNMSG  ERR7



010022  004537  014530                    JSR     R5,CKERLT                ;INCREMENT ERROR AND CHECK LIMIT

010026                                    ENDMSG
010026                            L10007:
010026  104423                            TRAP    C$MSG



010030                            BGNMSG  ERR8

010030  004737  010522                    JSR     PC,LINE1
010034  004737  010556                    JSR     PC,LINE2
010040                                    PRINTB  #FRMT6,TMP1,GDDAT,BDDAT
010040  013746  002302                    MOV     BDDAT,-(SP)
010044  013746  002300                    MOV     GDDAT,-(SP)
010050  013746  002274                    MOV     TMP1,-(SP)
010054  012746  011277                    MOV     #FRMT6,-(SP)
010060  012746  000004                    MOV     #4,-(SP)
010064  010600                            MOV     SP,R0
010066  104414                            TRAP    C$PNTB
010070  062706  000012                    ADD     #12,SP


01007.  004537  014530                    JSR     R5,CKERLT                ;INCREMENT ERROR AND CHECK LIMIT

010100                                    ENDMSG
010100                            L10010:
010100  104423                            TRAP    C$MSG

010102                            BGNMSG  ERR9

010102  004737  010522                    JSR     PC,LINE1
010106  004737  010556                    JSR     PC,LINE2
```

```
010112                                  PRINTB  #FRMT4,TMP0,R2
010112  010246                          MOV     R2,-(SP)
010114  013746  002272                  MOV     TMP0,-(SP)
010120  012746  011170                  MOV     #FRMT4,-(SP)
010124  012746  000003                  MOV     #3,-(SP)
010130  010600                          MOV     SP,R0
010132  104414                          TRAP    C$PNTB
010134  062706  000010                  ADD     #10,SP


010140  004537  014530                  JSR     R5,CKERLT               ;INCREMENT ERROR AND CHECK LIMIT

010144                                  ENDMSG
010144                          L10011:
010144  104423                          TRAP    C$MSG

010146                          BGNMSG  ERR10

010146  004737  010522                  JSR     PC,LINE1
010152  004737  010556                  JSR     PC,LINE2
010156                                  PRINTB  #FRMT7,TMP1,GDDAT,BDDAT
010156  013746  002302                  MOV     BDDAT,-(SP)
010162  013746  002300                  MOV     GDDAT,-(SP)
010166  013746  002274                  MOV     TMP1,-(SP)
010172  012746  011354                  MOV     #FRMT7,-(SP)
010176  012746  000004                  MOV     #4,-(SP)
010202  010600                          MOV     SP,R0
010204  104414                          TRAP    C$PNTB
010206  062706  000012                  ADD     #12,SP


010212  004537  014530                  JSR     R5,CKERLT               ;INCREMENT ERROR AND CHECK LIMIT

010216                                  ENDMSG
010216                          L10012:
010216  104423                          TRAP    C$MSG

010220                          BGNMSG  ERR11

010220  004737  010522                  JSR     PC,LINE1
010224  004737  010556                  JSR     PC,LINE2
010230                                  PRINTB  #FRMT8,TMP0,GDDAT,BDDAT
010230  013746  002302                  MOV     BDDAT,-(SP)
010234  013746  002300                  MOV     GDDAT,-(SP)
010240  013746  002272                  MOV     TMP0,-(SP)
010244  012746  011426                  MOV     #FRMT8,-(SP)
010250  012746  000004                  MOV     #4,-(SP)
010254  010600                          MOV     SP,R0
010256  104414                          TRAP    C$PNTB
010260  062706  000012                  ADD     #12,SP


010264  004537  014530                  JSR     R5,CKERLT               ;INCREMENT ERROR AND CHECK LIMIT

010270                                  ENDMSG
010270                          L10013:
```

```
(3)   010270  104423                            TRAP    C$MSG

      010272                            BGNMSG  ERR12

      010272  004737  010522                    JSR     PC,LINE1
      010276  004737  010556                    JSR     PC,LINE2
      010302                                    PRINTB  #FRMT9,TMP1,R3,GDDAT,BDDAT
(11)  010302  013746  002302                    MOV     BDDAT,-(SP)
(10)  010306  013746  002300                    MOV     GDDAT,-(SP)
(9)   010312  010346                            MOV     R3,-(SP)
(8)   010314  013746  002274                    MOV     TMP1,-(SP)
(7)   010320  012746  011547                    MOV     #FRMT9,-(SP)
(6)   010324  012746  000005                    MOV     #5,-(SP)
(3)   010330  010600                            MOV     SP,R0
(4)   010332  104414                            TRAP    C$PNTB
(4)   010334  062706  000014                    ADD     #14,SP


      010340  004537  014530                    JSR     R5,CKERLT               ;INCREMENT ERROR AND CHECK LIMIT

      010344                                    ENDMSG
(3)   010344                            L10014:
(3)   010344  104423                            TRAP    C$MSG

      010346                            BGNMSG  ERR13

      010346  004737  010522                    JSR     PC,LINE1
      010352                                    PRINTB  #FRMT10,OPIMN,OPIMX,BDDAT
(10)  010352  013746  002302                    MOV     BDDAT,-(SP)
(9)   010356  013746  002414                    MOV     OPIMX,-(SP)
(8)   010362  013746  002412                    MOV     OPIMN,-(SP)
(7)   010366  012746  011652                    MOV     #FRMT10,-(SP)
(6)   010372  012746  000004                    MOV     #4,-(SP)
(3)   010376  010600                            MOV     SP,R0
(4)   010400  104414                            TRAP    C$PNTB
(4)   010402  062706  000012                    ADD     #12,SP


      010406  004537  014530                    JSR     R5,CKERLT               ;INCREMENT ERROR AND CHECK LIMIT

      010412                                    ENDMSG
(3)   010412                            L10015:
(3)   010412  104423                            TRAP    C$MSG

      010414                            BGNMSG  ERR14

      010414  004737  010522                    JSR     PC,LINE1
      010420  004737  010556                    JSR     PC,LINE2
      010424                                    PRINTB  #FRMT14,TMP1,#BUF
(9)   010424  012746  003426                    MOV     #BUF,-(SP)
(8)   010430  013746  002274                    MOV     TMP1,-(SP)
(7)   010434  012746  011476                    MOV     #FRMT14,-(SP)
(6)   010440  012746  000003                    MOV     #3,-(SP)
(3)   010444  010600                            MOV     SP,R0
(4)   010446  104414                            TRAP    C$PNTB
(4)   010450  062706  000010                    ADD     #10,SP
```

```


      010454  004537  014530                JSR     R5,CKERLT                   ;INCREMENT ERROR AND CHECK LIMIT

      010460                                ENDMSG
(3)   010460                        L10016:
(3)   010460  104423                        TRAP    C$MSG

      010462                        BGNMSG  ERR15

      010462  004737  010522                JSR     PC,LINE1
      010466  004737  010556                JSR     PC,LINE2
      010472                                PRINTB  #FRMT15,R2
(8)   010472  010246                        MOV     R2,-(SP)
(7)   010474  012746  012142                MOV     #FRMT15,-(SP)
(6)   010500  012746  000002                MOV     #2,-(SP)
(3)   010504  010600                        MOV     SP,R0
(4)   010506  104414                        TRAP    C$PNTB
(4)   010510  062706  000006                ADD     #6,SP
      010514  004537  014530                JSR     R5,CKERLT

      010520                                ENDMSG
(3)   010520                        L10017:
(3)   010520  104423                        TRAP    C$MSG

      010522                        LINE1:  PRINTB  #FRMT1,RLCS,<B,DRIVE+1>
(9)   010522  005046                        CLR     -(SP)
(9)   010524  153716  002247                BISB    DRIVE+1,(SP)
(8)   010530  013746  002354                MOV     RLCS,-(SP)
(7)   010534  012746  011052                MOV     #FRMT1,-(SP)
(6)   010540  012746  000003                MOV     #3,-(SP)
(3)   010544  010600                        MOV     SP,R0
(4)   010546  104414                        TRAP    C$PNTB
(4)   010550  062706  000010                ADD     #10,SP
      010554  000207                        RTS     PC

      010556                        LINE2:  PRINTB  #FRMT2,#BEREG,#ARLCS,B.CS,#ARLBA,B.BA
(12)  010556  013746  002332                MOV     B.BA,-(SP)
(11)  010562  012746  003435                MOV     #ARLBA,-(SP)
(10)  010566  013746  002330                MOV     B.CS,-(SP)
(9)   010572  012746  003430                MOV     #ARLCS,-(SP)
(8)   010576  012746  003457                MOV     #BEREG,-(SP)
(7)   010602  012746  011102                MOV     #FRMT2,-(SP)
(6)   010606  012746  000006                MOV     #6,-(SP)
(3)   010612  010600                        MOV     SP,R0
(4)   010614  104414                        TRAP    C$PNTB
(4)   010616  062706  000016                ADD     #16,SP
      010622                                PRINTB  #FRMT2A,#ARLDA,B.DA,#ARLMP,B.MP
(11)  010622  013746  002336                MOV     B.MP,-(SP)
(10)  010626  012746  003451                MOV     #ARLMP,-(SP)
(9)   010632  013746  002334                MOV     B.DA,-(SP)
(8)   010636  012746  003443                MOV     #ARLDA,-(SP)
(7)   010642  012746  011121                MOV     #FRMT2A,-(SP)
(6)   010646  012746  000005                MOV     #5,-(SP)
(3)   010652  010600                        MOV     SP,R0
(4)   010654  104414                        TRAP    C$PNTB
```

```
 (4)  010656  062706  000014                      ADD     #14,SP
605   010662                                      PRINTB  #FRMT2,#AFREG,#ARLCS,E.CS,#ARLBA,E.BA
 (12) 010662  013746  002342                      MOV     E.BA,-(SP)
 (11) 010666  012746  003435                      MOV     #ARLBA,-(SP)
 (10) 010672  013746  002340                      MOV     E.CS,-(SP)
 (9)  010676  012746  003430                      MOV     #ARLCS,-(SP)
 (8)  010702  012746  003500                      MOV     #AFREG,-(SP)
 (7)  010706  012746  011102                      MOV     #FRMT2,-(SP)
 (6)  010712  012746  000006                      MOV     #6,-(SP)
 (3)  010716  010600                              MOV     SP,R0
 (4)  010720  104414                              TRAP    C$PNTB
 (4)  010722  062706  000016                      ADD     #16,SP
606   010726                                      PRINTB  #FRMT2B,#ARLDA,E.DA,#ARLMP,E.MP,E.MP1,E.MP2
 (13) 010726  013746  002352                      MOV     E.MP2,-(SP)
 (12) 010732  013746  002350                      MOV     E.MP1,-(SP)
 (11) 010736  013746  002346                      MOV     E.MP,-(SP)
 (10) 010742  012746  003451                      MOV     #ARLMP,-(SP)
 (9)  010746  013746  002344                      MOV     E.DA,-(SP)
 (8)  010752  012746  003443                      MOV     #ARLDA,-(SP)
 (7)  010756  012746  011134                      MOV     #FRMT2B,-(SP)
 (6)  010762  012746  000007                      MOV     #7,-(SP)
 (3)  010766  010600                              MOV     SP,R0
 (4)  010770  104414                              TRAP    C$PNTB
 (4)  010772  062706  000020                      ADD     #20,SP
607   010776  000207                              RTS     PC
608
609   011000                            LINE3:    PRINTB  #FRMT3,#EM1
 (8)  011000  012746  004467                      MOV     #EM1,-(SP)
 (7)  011004  012746  011163                      MOV     #FRMT3,-(SP)
 (6)  011010  012746  000002                      MOV     #2,-(SP)
 (3)  011014  010600                              MOV     SP,R0
 (4)  011016  104414                              TRAP    C$PNTB
 (4)  011020  062706  000006                      ADD     #6,SP
610   011024                                      PRINTB  #FRMT3,#EM100
 (8)  011024  012746  004522                      MOV     #EM100,-(SP)
 (7)  011030  012746  011163                      MOV     #FRMT3,-(SP)
 (6)  011034  012746  000002                      MOV     #2,-(SP)
 (3)  011040  010600                              MOV     SP,R0
 (4)  011042  104414                              TRAP    C$PNTB
 (4)  011044  062706  000006                      ADD     #6,SP
611   011050  000207                              RTS     PC
612
613
617
618   011052  040445  047103  051124  FRMT1:    .ASCIZ  /%ACNTRLR: %06%A DRV %01/
619   011102  047045  052045  052045  FRMT2:    .ASCIZ  /%N%T%T%06%T%06/
620   011121     045  022524  033117  FRMT2A:   .ASCIZ  /%T%06%T%06/
621   011134  052045  047445  022466  FRMT2B:   .ASCIZ  /%T%06%T%06%A %06%A %06/
622   011163     045  022516  000124  FRMT3:    .ASCIZ  /%N%T/
623   011170  047045  040445  054105  FRMT4:    .ASCIZ  /%N%AEXP'D: %06%A REC'D: %06%N/
624   011226  047045  040445  040514  FRMT5:    .ASCIZ  /%N%ALAST: %06%A PRES: %06%A EXP'D: %06%N/
625   011277     045  022516  041101  FRMT6:    .ASCIZ  /%N%ABUS ADR: %06%A EXP'D: %06%A REC'D: %06%N/
626   011354  047045  040445  047527  FRMT7:    .ASCIZ  /%N%AWORD: %D3%A EXP'D: %06%A REC'D: %06%N/
627   011426  047045  040445  040504  FRMT8:    .ASCIZ  /%N%ADA: %06%A REC'D: %06%A EXP'D: %06%N/
628   011476  047045  040445  047527  FRMT14:   .ASCIZ  /%N%AWORDS WRITTEN: %D3%A BUS ADDR: %06%N/
629   011547     045  022516  053501  FRMT9:    .ASCIZ  /%N%AWORDS WRITTEN: %D3%A BUS ADDR: %06%A EXP'D: %06%A REC'D: %06%N/
```

```
    011652 047045  040445  040522  FRMT10: .ASCII  /%N%ARANGE %D3%A - %D3%A  MILLISECONDS WAS %D6%N/
    011731    045  046501  054101          .ASCIZ  /%AMAX TIMEOUT OF PROGRAM IS 3 SECONDS%N/
    012001    045  022516  042501  FRMT11: .ASCIZ  /%N%AERR LIMIT EXCEEDED - DROPPED%N/
    012044 040445  051104  020126  FRMT98: .ASCII  /%ADRV DID NOT RCVR FROM POWER FAIL/
    012106 047045     000          FRMT99: .ASCIZ  /%N/
    012111    045  022516  022524  FRMT13: .ASCIZ  /%N%T%A - WILL NOT TEST%N/
    012142 047045  040445  040520  FRMT15: .ASCIZ  /%N%APATTERN WAS: %06/
    012167    045  022516  042101  FRMT16: .ASCIZ  /%N%ADRIVE DROPPED - NO CONTROLLER%N/
    012233    045  022516  042101  FRMT17: .ASCIZ  /%N%ADRIVE DROPPED - DID NOT RESPOND WITH 'READY'%N/
    012316 047045  040445  042524  FRMT18: .ASCIZ  /%N%ATEST 7 CANNOT BE PERFORMED...CLOCK IS NOT AVAILABLE/

                                   .EVEN



    012406                         ENDMOD

                                   ;LOAD PROTECTION TABLE
    012406                         BGNPROT
    012406 000000                          .WORD    0                 ;OFFSET OF CSR IN P-TABLE
    012410 177777                          .WORD   -1                 ;NOT A MASS-BUS DRIVE
    012412 000010                          .WORD   10                 ;OFFSET OF DRIVE IN P-TABLE
    012414                         ENDPROT

    012414                         BGNMOD  HPTCODE
    012414                         BGNHW
(3) 012414 000006                          .WORD   L10021-L$HW/2

    012416 174400                          .WORD   174400             ;CSR
    012420 000160                          .WORD   160                ;VECTOR
    012422 000240                          .WORD   240                ;PRIORITY
    012424 000001                          .WORD   1                  ;TYPE OF DRIVE RL01 OR RL02
    012426 000000                          .WORD   0                  ;DRIVE (BITS 8,9,10)
    012430 000001                          .WORD   1                  ;RL11=1 RLV11=0

    012432                         ENDHW
(3) 012432                         L10021:
    012432                         ENDMOD

    012432                         BGNMOD  SPTCODE
    012432                         BGNSW
(3) 012432 000005                          .WORD   L10022-L$SW/2

    012434 000000                  DROP:   .WORD   0
    012436 000012                  MERLMT: .WORD   10.
    012440 000000                  T.DMP:  .WORD   0
    012442 000000                  T.LMT:  .WORD   0
    012444 000001                  T.ANS:  .WORD   1

    012446                         ENDSW
(3) 012446                         L10022:
    012446                         ENDMOD

    012446                         BGNMOD  DSPCODE

    012446                         DISPATCH        44
(4) 012446 000054                          .WORD   44
```

```
(6)  012450  016242                             .WORD    T1
(6)  012452  016406                             .WORD    T2
(6)  012454  016536                             .WORD    T3
(6)  012456  016672                             .WORD    T4
(6)  012460  017024                             .WORD    T5
(6)  012462  017162                             .WORD    T6
(6)  012464  017360                             .WORD    T7
(6)  012466  020002                             .WORD    T8
(6)  012470  020172                             .WORD    T9
(6)  012472  020370                             .WORD    T10
(6)  012474  020542                             .WORD    T11
(6)  012476  020740                             .WORD    T12
(6)  012500  021140                             .WORD    T13
(6)  012502  021242                             .WORD    T14
(6)  012504  021366                             .WORD    T15
(6)  012506  021562                             .WORD    T16
(6)  012510  021716                             .WORD    T17
(6)  012512  022050                             .WORD    T18
(6)  012514  022170                             .WORD    T19
(6)  012516  022350                             .WORD    T20
(6)  012520  023162                             .WORD    T21
(6)  012522  023356                             .WORD    T22
(6)  012524  023522                             .WORD    T23
(6)  012526  023706                             .WORD    T24
(6)  012530  024072                             .WORD    T25
(6)  012532  024472                             .WORD    T26
(6)  012534  025114                             .WORD    T27
(6)  012536  025542                             .WORD    T28
(6)  012540  026222                             .WORD    T29
(6)  012542  026654                             .WORD    T30
(6)  012544  027270                             .WORD    T31
(6)  012546  027522                             .WORD    T32
(6)  012550  030012                             .WORD    T33
(6)  012552  030306                             .WORD    T34
(6)  012554  030600                             .WORD    T35
(6)  012556  031172                             .WORD    T36
(6)  012560  031472                             .WORD    T37
(6)  012562  032032                             .WORD    T38
(6)  012564  032344                             .WORD    T39
(6)  012566  032670                             .WORD    T40
(6)  012570  032760                             .WORD    T41
(6)  012572  033112                             .WORD    T42
(6)  012574  033310                             .WORD    T43
(6)  012576  033446                             .WORD    T44
684
685  012600                         ENDMOD
686
```

```
    688
    689                                         .SBTTL  INITIALIZATION CODE
    690
    691  012600                                 BGNMOD  INITCODE
    692  012600                                 BGNINIT
    693  012600                                         SETPRI  #PRI07
    (3)  012600  012700  000340                         MOV     #PRI07,R0
    (3)  012604  104441                                 TRAP    C$SPRI
    694  012606                                         READEF  #EF.PWR
    (3)  012606  012700  000034                         MOV     #EF.PWR,R0
    (3)  012612  104447                                 TRAP    C$REFG
    695  012614                                         BNCOMPLETE      NOPWR
    (2)  012614  103004                                 BCC     NOPWR
    696  012616  013737  002012  002416                 MOV     L$UNIT,PWRFLG
    697  012624  000475                                 BR      CONT
    698  012626                         NOPWR:          READEF  #EF.RESTART
    (3)  012626  012700  000037                         MOV     #EF.RESTART,R0
    (3)  012632  104447                                 TRAP    C$REFG
    699  012634                                         BCOMPLETE       START1
    (2)  012634  103404                                 BCS     START1
    700  012636                                         READEF  #EF.START
    (3)  012636  012700  000040                         MOV     #EF.START,R0
    (3)  012642  104447                                 TRAP    C$REFG
    701  012644                                         BNCOMPLETE      CONTINUET
    (2)  012644  103010                                 BCC     CONTINUET
    702  012646  012700  002426         START1:         MOV     #ERCOUNT,R0
    703  012652  012701  000100                         MOV     #64.,R1
    704  012656  005020                 1$:             CLR     (R0)+
    705  012660  005301                                 DEC     R1
    706  012662  001375                                 BNE     1$
    707  012664  000407                                 BR      START
    708  012666                         CONTINUE:               READEF  #EF.CONTINUE
    (3)  012666  012700  000036                         MOV     #EF.CONTINUE,R0
    (3)  012672  104447                                 TRAP    C$REFG
    709  012674                                         BCOMPLETE       CONT
    (2)  012674  103451                                 BCS     CONT
    710  012676  005737  002250         NXT:            TST     UUT                     ;DONE WITH ALL UNITS
    711  012702  001011                                 BNE     XXX                     ;NO
    712  012704  012737  177777  002252 START:          MOV     #-1,UNITST
    713  012712  013737  002012  002250                 MOV     L$UNIT,UUT
    714  012720  012737  002424  002424                 MOV     #ERCOUNT-2,ERPOINT
    715  012726  005237  002252         XXX:            INC     UNITST
    716  012732  062737  000002  002424                 ADD     #2,ERPOINT
    717  012740  005337  002250                         DEC     UUT
    718  012744                         REST:           GPHARD  UNITST,R0
    (3)  012744  013700  002252                         MOV     UNITST,R0
    (3)  012750  104442                                 TRAP    C$GPHRD
    719  012752                                         BCOMPLETE       2$
    (2)  012752  103406                                 BCS     2$
    720  012754  005737  002416                         TST     PWRFLG
    721  012760  001746                                 BEQ     NXT
    722  012762  005337  002416                         DEC     PWRFLG
    723  012766  000743                                 BR      NXT
    724  012770  012037  002364         2$:             MOV     (R0)+,BCSR              ;GET BUS ADDRESS
    725  012774  012037  002366                         MOV     (R0)+,BVEC              ;GET VECTOR
    726  013000  012037  002370                         MOV     (R0)+,BPRIOR            ;GET PRIORITY
```

```
 727  013004  012037  002232                    MOV     (R0)+,T.DRIVE           ;GET TYPE OF DRIVE
 728  013010  012037  002246                    MOV     (R0)+,DRIVE             ;GET DRIVE
 729  013014  012037  002420                    MOV     (R0)+,T.CNTLR           ;GET CONTROLLER TYPE
 730  013020  013700  002364           CONT:    MOV     BCSR,R0                 ;CREATE REGISTERS
 731  013024  010037  002354                    MOV     R0,RLCS
 732  013030  062700  000002                    ADD     #2,R0
 733  013034  010037  002356                    MOV     R0,RLBA
 734  013040  062700  000002                    ADD     #2,R0
 735  013044  010037  002360                    MOV     R0,RLDA
 736  013050  062700  000002                    ADD     #2,R0
 737  013054  010037  002362                    MOV     R0,RLMP
 738  013060  005737  002416                    TST     PWRFLG                  ;POWER UP?
 739  013064  001452                            BEQ     END                     ;NO
 740  013066  012777  000200  167260            MOV     #200,@RLCS
 741  013074  053777  002246  167252            BIS     DRIVE,@RLCS
 742  013102  012701  000170                    MOV     #120.,R1                ;INITIALIZE WAIT COUNT
 743  013106                           3$:      WAITMS  #10.
 744  013120  032777  000001  167226            BIT     #1,@RLCS
 745  013126  001031                            BNE     END
 746  013130  005301                            DEC     R1
 747  013132  001365                            BNE     3$
 748  013134                                    PRINTF  #FRMT99
 (7)  013134  012746  012106                    MOV     #FRMT99,-(SP)
 (6)  013140  012746  000001                    MOV     #1,-(SP)
 (3)  013144  010600                            MOV     SP,R0
 (4)  013146  104417                            TRAP    C$PNTF
 (4)  013150  062706  000004                    ADD     #4,SP
 749  013154                                    PRINTF  #FRMT98
 (7)  013154  012746  012044                    MOV     #FRMT98,-(SP)
 (6)  013160  012746  000001                    MOV     #1,-(SP)
 (3)  013164  010600                            MOV     SP,R0
 (4)  013166  104417                            TRAP    C$PNTF
 (4)  013170  062706  000004                    ADD     #4,SP
 750  013174  004737  010522                    JSR     PC,LINE1
 751  013200                                    DODU    UNITST
 (3)  013200  013700  002252                    MOV     UNITST,R0
 (3)  013204  104451                            TRAP    C$DODU
 752  013206  000137  012676                    JMP     NXT
 753  013212  013737  002410  002412  END:      MOV     UOPIMN,OPIMN
 754  013220  013737  002406  002414            MOV     UOPIMX,OPIMX
 755  013226  005737  002420                    TST     T.CNTLR          ;RL11??
 756  013232  001006                            BNE     1$               ;YES, THEN KEEP LIMITS SET
 757  013234  013737  002404  002412            MOV     LOPIMN,OPIMN
 758  013242  013737  002402  002414            MOV     LOPIMX,OPIMX
 759  013250                           1$:      SETVEC  BVEC,#INTSRV,#340
 (7)  013250  012746  000340                    MOV     #340,-(SP)
 (6)  013254  012746  014466                    MOV     #INTSRV,-(SP)
 (5)  013260  013746  002366                    MOV     BVEC,-(SP)
 (4)  013264  012746  000003                    MOV     #3,-(SP)
 (3)  013270  104437                            TRAP    C$SVEC
 (2)  013272  062706  000010                    ADD     #10,SP
 760  013276                           ENDINIT
 (3)  013276                           L10023:
 (3)  013276  104411                            TRAP    C$INIT
 761  013300                           ENDMOD
 762
```

```
    764                                          .SBTTL  AUTO DROP SECTION
    765
    766  013300                                  BGNAUTO
    767  013300  005037  002254                          CLR     TRPFLG                  ;CLEAR TRAP FLAG
    768  013304                                          SETVEC  ERRVEC,#TRPHAN,#340 ;SET UP TRAP VECTOR TO DETECT
    (7)  013304  012746  000340                          MOV     #340,-(SP)
    (6)  013310  012746  015760                          MOV     #TRPHAN,-(SP)
    (5)  013314  013746  002244                          MOV     ERRVEC,-(SP)
    (4)  013320  012746  000003                          MOV     #3,-(SP)
    (3)  013324  104437                                  TRAP    C$SVEC
    (2)  013326  062706  000010                          ADD     #10,SP
    769                                                                          ;/NON-EXISTENT CONTROLLER
    770  013332  005777  167016                          TST     @RLCS           ;ACCESS CONTROLLER
    771  013336                                          CLRVEC  ERRVEC          ;RELEASE TRAP VECTOR
    (3)  013336  013700  002244                          MOV     ERRVEC,R0
    (3)  013342  104436                                  TRAP    C$CVEC
    772  013344  005737  002254                          TST     TRPFLG          ;DID IT TRAP?
    773  013350  001416                                  BEQ     1$              ;NO - CHECK ITS DRIVE
    774  013352                                          PRINTB  #FRMT16         ;ELSE, PRINT MSG. 'DRIVE DROPPED - NO CONTROLLER''
    (7)  013352  012746  012167                          MOV     #FRMT16,-(SP)
    (6)  013356  012746  000001                          MOV     #1,-(SP)
    (3)  013362  010600                                  MOV     SP,R0
    (4)  013364  104414                                  TRAP    C$PNTB
    (4)  013366  062706  000004                          ADD     #4,SP
    775  013372  004737  010522                          JSR     PC,LINE1        ;PROVIDE DRIVE INFORMATION
    776  013376                                          DODU    UNITST          ;DO DROP UNIT ON DRIVE
    (3)  013376  013700  002252                          MOV     UNITST,R0
    (3)  013402  104451                                  TRAP    C$DODU
    777  013404  000427                                  BR      2$              ;EXIT
    778  013406  012777  000200  166740  1$:             MOV     #200,@RLCS      ;SET CONTROLLER READY
    779  013414  053777  002246  166732                  BIS     DRIVE,@RLCS     ;SELECT DRIVE
    780  013422  032777  000001  166724                  BIT     #1,@RLCS        ;IS DRIVE READY?
    781  013430  001015                                  BNE     2$              ;YES - EXIT
    782  013432                                          PRINTB  #FRMT17         ;ELSE, PRINT MSG. 'DRIVE DROPPED - DID NOT
    (7)  013432  012746  012233                          MOV     #FRMT17,-(SP)
    (6)  013436  012746  000001                          MOV     #1,-(SP)
    (3)  013442  010600                                  MOV     SP,R0
    (4)  013444  104414                                  TRAP    C$PNTB
    (4)  013446  062706  000004                          ADD     #4,SP
    783                                                                          ;/RESPOND WITH 'READY'''
    784  013452  004737  010522                          JSR     PC,LINE1        ;PROVIDE DRIVE INFORMATION
    785  013456                                          DODU    UNITST          ;DO DROP UNIT ON DRIVE
    (3)  013456  013700  002252                          MOV     UNITST,R0
    (3)  013462  104451                                  TRAP    C$DODU
    786  013464                                  2$:
    787  013464                                  ENDAUTO
    (3)  013464                                  L10024:
    (3)  013464  104461                                  TRAP    C$AUTO
    788
    789
    791
    792                                        .SBTTL  CLEANUP CODE SECTION
    793
    794  013466                                BGNMOD  CLNCODE
    795  013466                                BGNCLN
    796
    797  013466                                        SETVEC  ERRVEC,#TRPHAN,#340
    (7)  013466  012746  000340                        MOV     #340,-(SP)
    (6)  013472  012746  015760                        MOV     #TRPHAN,-(SP)
    (5)  013476  013746  002244                        MOV     ERRVEC,-(SP)
    (4)  013502  012746  000003                        MOV     #3,-(SP)
    (3)  013506  104437                                TRAP    C$SVEC
    (2)  013510  062706  000010                        ADD     #10,SP
    798  013514  032777  000200  166632  1$:           BIT     #CRDY,@RLCS
    799  013522  001774                                BEQ     1$
    800  013524  042777  000100  166622                BIC     #INTEN,@RLCS
    801  013532                                        CLRVEC  BVEC
    (3)  013532  013700  002366                        MOV     BVEC,R0
    (3)  013536  104436                                TRAP    C$CVEC
    802  013540  005737  002416                        TST     PWRFLG
    803  013544  001402                                BEQ     2$
    804  013546  005337  002416                        DEC     PWRFLG
    805  013552                                2$:     CLRVEC  ERRVEC
    (3)  013552  013700  002244                        MOV     ERRVEC,R0
    (3)  013556  104436                                TRAP    C$CVEC
    806
    807  013560                                ENDCLN
    (3)  013560                                L10025:
    (3)  013560  104412                                TRAP    C$CLEAN
    808  013562                                ENDMOD
    809
    821
```

```
 823
 824                                         .SBTTL  GLOBAL SUBROUTINES
 825
 826  013566                                 BGNMOD  GLBSUB
 827
 828
 829  013566  012737  000160  002116  TIME:   MOV     #160,L$DLY              ;GET OUTER DELAY LOOP
 830  013574  005237  002636                  INC     TIM.US                  ;US-WAIT ROUTINE INDICATOR
 831  013600  005437  002626                  NEG     XDELAY                  ;GET NEGATIVE OF FACTOR
 832  013604  005737  002420                  TST     T.CNTLR                 ;RL11?
 833  013610  001420                          BEQ     2$                      ;BRANCH - IF NO
 834  013612                          1$:     DELAY   #1.                     ;WAIT AT LEAST 100 US--
 (2)  013612  012727  000001                  MOV     ##1.,(PC)+
 (2)  013616  000000                          .WORD   0
 (2)  013620  013727  002116                  MOV     L$DLY,(PC)+
 (2)  013624  000000                          .WORD   0
 (2)  013626  005367  177772                  DEC     -6(PC)
 (2)  013632  001375                          BNE     .-4
 (2)  013634  005367  177756                  DEC     -22(PC)
 (2)  013640  001367                          BNE     .-20
 835  013642  005237  002626                  INC     XDELAY                  ;WAIT FACTOR EXPIRED?
 836  013646  002761                          BLT     1$                      ;BRANCH - IF NO
 837  013650  000422                          BR      4$                      ;EXIT
 838  013652  012737  000150  002116  2$:     MOV     #150,L$DLY              ;GET OUTER DELAY LOOP
 839  013660                          3$:     DELAY   #1.                     ;WAIT WITH RESPECT TO FONZ BUS
 (2)  013660  012727  000001                  MOV     ##1.,(PC)+
 (2)  013664  000000                          .WORD   0
 (2)  013666  013727  002116                  MOV     L$DLY,(PC)+
 (2)  013672  000000                          .WORD   0
 (2)  013674  005367  177772                  DEC     -6(PC)
 (2)  013700  001375                          BNE     .-4
 (2)  013702  005367  177756                  DEC     -22(PC)
 (2)  013706  001367                          BNE     .-20
 840  013710  005237  002626                  INC     XDELAY                  ;WAIT FACTOR EXPIRED?
 841  013714  002761                          BLT     3$                      ;BRANCH - IF NO
 842  013716  000207                  4$:     RTS     PC                      ;RETURN
 843
 844  013720  012737  000160  002116  XTIME:  MOV     #160,L$DLY              ;GET OUTER DELAY LOOP
 845  013726  005037  002636                  CLR     TIM.US                  ;MS WAIT INDICATOR
 846  013732  006337  002630                  ASL     YDELAY                  ;MULTIPLY BY FACTOR 4
 847  013736  006337  002630                  ASL     YDELAY                  ; -------
 848  013742  005437  002630                  NEG     YDELAY                  ;GET NEGATIVE OF RESULT
 849  013746  005737  002420                  TST     T.CNTLR                 ;RL11?
 850  013752  001023                          BNE     1$                      ;BRANCH - IF YES
 851  013754  012737  000150  002116          MOV     #150,L$DLY              ;GET OUTER DELAY LOOP
 852  013762                          2$:     DELAY   #20                     ;WAIT WITH RESPECT TO FONZ BUS
 (2)  013762  012727  000020                  MOV     ##20,(PC)+
 (2)  013766  000000                          .WORD   0
 (2)  013770  013727  002116                  MOV     L$DLY,(PC)+
 (2)  013774  000000                          .WORD   0
 (2)  013776  005367  177772                  DEC     -6(PC)
 (2)  014002  001375                          BNE     .-4
 (2)  014004  005367  177756                  DEC     -22(PC)
 (2)  014010  001367                          BNE     .-20
 853  014012  005237  002630                  INC     YDELAY                  ;WAIT FACTOR EXPIRED?
 854  014016  002761                          BLT     2$                      ;BRANCH - IF NO
 855  014020  000417                          BR      3$                        ;GET TIME
 856  014022                          1$:     DELAY   #10                       ;WAIT AT LEAST 25 MS
 (2)  014022  012727  000010                  MOV     ##10,(PC)+
 (2)  014026  000000                          .WORD   0
 (2)  014030  013727  002116                  MOV     L$DLY,(PC)+
 (2)  014034  000000                          .WORD   0
 (2)  014036  005367  177772                  DEC     -6(PC)
 (2)  014042  001375                          BNE     .-4
 (2)  014044  005367  177756                  DEC     -22(PC)
 (2)  014050  001367                          BNE     .-20
 857  014052  005237  002630                  INC     YDELAY                    ;WAIT FACTOR EXPIRED?
 858  014056  002761                          BLT     1$                        ;BRANCH - IF NO
 859  014060  000207                  3$·     RTS     PC                        ;RETURN
 860
 861
 862  014062  010146                  SETCLK: MOV     R1,-(SP)                  ;SAVE R1
 863  014064                                  CLOCK   P,PCLKCS                  ;PROGRAMMABLE CLOCK AVAILABLE? - CSR=772540
 (3)  014064  012700  000120                  MOV     #'P,R0
 (3)  014070  104462                          TRAP    C$CLCK
 (3)  014072  010037  002642                  MOV     R0,PCLKCS
 864  014076                                  BCOMPLETE       1$                ;BRANCH - IF YES
 (2)  014076  103447                          BCS     1$
 865  014100                                  CLOCK   L,PCLKCS                  ;LINE CLOCK AVAILABLE? - CSR=777546
 (3)  014100  012700  000114                  MOV     #'L,R0
 (3)  014104  104462                          TRAP    C$CLCK
 (3)  014106  010037  002642                  MOV     R0,PCLKCS
 866  014112                                  BCOMPLETE       20$               ;BRANCH IF L-CLOCK
 (2)  014112  103401                          BCS     20$
 867  014114  000462                          BR      2$                        ;ELSE, INDICATE CLOCK IS NOT PRESENT
 868  014116                          20$:    READBUS                           ;CHECK TYPE OF BUS
 (3)  014116  104407                          TRAP    C$RDBU
 869  014120                                  BNCOMPLETE      1$                ;BRANCH IF NOT Q-BUS
 (2)  014120  103036                          BCC     1$
 870  014122  005037  002666                  CLR     CLKFLD                    ;CLEAR CLOCK FIELD FOR STORING "TICKS"
 871  014126                                  SETVEC  #100,#CLKTIK,#340         ;SET UP LSI-11 L-CLOCK INTERRUPT VECTOR
 (7)  014126  012746  000340                  MOV     #340,-(SP)
 (6)  014132  012746  014522                  MOV     #CLKTIK,-(SP)
 (5)  014136  012746  000100                  MOV     #100,-(SP)
 (4)  014142  012746  000003                  MOV     #3,-(SP)
 (3)  014146  104437                          TRAP    C$SVEC
 (2)  014150  062706  000010                  ADD     #10,SP
 872                                                                            ;/TO CHECK IF CLOCK IS "TICKING"
 873  014154                                  SETPRI  #PRI05                    ;SET PRIORITY TO 5 TO ALLOW CLOCK INTERRUPTS
 (3)  014154  012700  000240                  MOV     #PRI05,R0
 (3)  014160  104441                          TRAP    C$SPRI
 874  014162                                  WAITMS  #5                        ;PAUSE TO ALLOW CLOCK INTERRUPTS
 875  014174                                  SETPRI  #PRI07                    ;RESTORE PRIORITY TO 7 TO INHIBIT INTERRUPTS
 (3)  014174  012700  000340                  MOV     #PRI07,R0
 (3)  014200  104441                          TRAP    C$SPRI
 876  014202                                  CLRVEC  #100                      ;CLEAR L-CLOCK INTERRUPT VECTOR
 (3)  014202  012700  000100                  MOV     #100,R0
 (3)  014206  104436                          TRAP    C$CVEC
 877  014210  005737  002666                  TST     CLKFLD                    ;L-CLOCK "TICKS"?
 878  014214  001422                          BEQ     2$                        ;BRANCH IF NO "TICKS"
 879  014216  013701  002642          1$:     MOV     PCLKCS,R1                 ;GET POINTER TO CLOCK CONTROL STATUS REGISTER
 880  014222  011137  002644                  MOV     (R1),PCSR                 ;GET CLOCK CONTROL STATUS REGISTER
```

```
014226  016137  000004  002646          MOV     4(R1),VEC               ;GET CLOCK VECTOR ADDRESS
014234  016137  000006  002650          MOV     6(R1),HZ                ;GET CLOCK FREQUENCY
014242  022737  000074  002650          CMP     #60.,HZ                 ;60 HZ.?
014250  001407                          BEQ     3$                      ;BRANCH - IF YES
014252  022737  000062  002650          CMP     #50.,HZ                 ;50 HZ.?
014260  001420                          BEQ     4$                      ;BRANCH - IF YES
014262  005237  002652          2$:     INC     XITFLG                  ;SET EXIT FLAG
014266  000475                          BR      8$                      ;EXIT
014270  005737  002420          3$:     TST     T.CNTLR                 ;RL11?
014274  001404                          BEQ     9$                      ;BRANCH - IF NO
014276  012737  000030  002664          MOV     #24.,OPITIM             ;SET OPIMX FOR 60 HZ CLOCK & RL11
014304  000403                          BR      10$                     ;CONTINUE
014306  012737  000047  002664  9$:     MOV     #39.,OPITIM             ;SET OPIMX FOR 60 HZ CLOCK & RLV11
014314  005237  002656          10$:    INC     SIXTY                   ;SET 60 HZ CLOCK INDICATOR
014320  000414                          BR      5$                      ;CHECK CLOCK TYPE
014322  005737  002420          4$:     TST     T.CNTLR                 ;RL11?
014326  001404                          BEQ     11$                     ;BRANCH - IF NO
014330  012737  000024  002664          MOV     #20.,OPITIM             ;SET OPIMX FOR 50 HZ CLOCK & RL11
014336  000403                          BR      12$                     ;CONTINUE
014340  012737  000040  002664  11$:    MOV     #32.,OPITIM             ;SET OPIMX FOR 50 HZ CLOCK & RLV11
014346  005237  002654          12$:    INC     FIFTY                   ;SET 50 HZ. CLOCK INDICATOR
014352  022737  000104  002646  5$:     CMP     #104,VEC                ;P-CLOCK?
014360  001016                          BNE     6$                      ;BRANCH - IF NO
014362  005237  002660                  INC     PCLOCK                  ;SET P-CLOCK INDICATOR
014366                                  SETVEC  VEC,#CLKINT,#340        ;SET CLOCK INTERRUPT SERVICE ROUTINE
014366  012746  000340                  MOV     #340,-(SP)
014372  012746  014506                  MOV     #CLKINT,-(SP)
014376  013746  002646                  MOV     VEC,-(SP)
014402  012746  000003                  MOV     #3,-(SP)
014406  104437                          TRAP    C$SVEC
014410  062706  000010                  ADD     #10,SP
014414  000422                          BR      8$                      ;EXIT
014416  022737  000100  002646  6$:     CMP     #100,VEC                ;L-CLOCK?
014424  001401                          BEQ     7$                      ;BRANCH - IF YES
014426  000715                          BR      2$                      ;EXIT
014430                          7$:     SETVEC  VEC,#CLKINT,#340        ;SET CLOCK INTERRUPT SERVICE ROUTINE
014430  012746  000340                  MOV     #340,-(SP)
014434  012746  014506                  MOV     #CLKINT,-(SP)
014440  013746  002646                  MOV     VEC,-(SP)
014444  012746  000003                  MOV     #3,-(SP)
014450  104437                          TRAP    C$SVEC
014452  062706  000010                  ADD     #10,SP
014456  005037  002660                  CLR     PCLOCK                  ;INIT P-CLOCK INDICATOR
014462  012601                  8$:     MOV     (SP)+,R1                ;RESTORE R1
014464  000207                          RTS     PC                      ;RETURN


014466                          BGNSRV
014466                          INTSRV:

014466  005237  002256                  INC     INTFLG                  ;SET INTERRUPT OCCURANCE FLAG

014472                          ENDSRV
014472                          L10027:
014472  000002                          RTI

```

```
 923
 924                                        ;ROUTINE USED IN TIMING OPI
 925
 926  014474                                BGNSRV
 927  014474                                TIMSRV:
 928
 929  014474  005237  002256                        INC     INTFLG                  ;SET INTERRUPT INDICATOR FLAG
 930  014500  005077  166140                        CLR     @PCSR                   ;DISABLE CLOCK
 931
 932  014504                                ENDSRV
 (3)  014504                                L10030:
 (2)  014504  000002                                RTI
 933
 934  014506                                BGNSRV
 935  014506                                CLKINT:                                 ;CLOCK INTERRUPT SERVICE ROUTINE
 936
 937  014506  005337  002664                        DEC     OPITIM                  ;OPIMX EXPIRED?
 938  014512  001002                                BNE     1$                      ;BRANCH - IF NO
 939  014514  005077  166124                        CLR     @PCSR                   ;DISABLE CLOCK
 940  014520                                1$:
 941
 942  014520                                ENDSRV
 (3)  014520                                L10031:
 (2)  014520  000002                                RTI
 943
 944
 945  014522                                BGNSRV
 946  014522                                CLKTIK:                                 ;L-CLOCK 'TICK'' CHECK ROUTINE FOR LSI-11
 947
 948  014522  005237  002666                        INC     CLKFLD                  ;INCREMENT CLOCK FIELD TO INDICATE THAT
 949                                                                                ;/CLOCK IS 'TICKING''
 950
 951  014526                                ENDSRV
 (3)  014526                                L10032:
 (2)  014526  000002                                RTI
 952
 953
 954  014530                                CKERLT: INLOOP
 (3)  014530  104420                                TRAP    C$INLP
 955  014532                                        BCOMPLETE       99$
 (2)  014532  103427                                BCS     99$
 956  014534  005737  012434                        TST     DROP
 957  014540  001424                                BEQ     99$
 958  014542  005277  165656                        INC     @ERPOINT
 959  014546  027737  165652  012436                CMP     @ERPOINT,MERLMT
 960  014554  002416                                BLT     99$
 961  014556                                        PRINTF  #FRMT11
 (7)  014556  012746  012001                        MOV     #FRMT11,-(SP)
 (6)  014562  012746  000001                        MOV     #1,-(SP)
 (3)  014566  010600                                MOV     SP,R0
 (4)  014570  104417                                TRAP    C$PNTF
 (4)  014572  062706  000004                        ADD     #4,SP
 962  014576  004737  010522                        JSR     PC,LINE1
 963  014602                                        DODU    UNITST  ;DROP THIS UNIT
 (3)  014602  013700  002252                        MOV     UNITST,R0
 (3)  014606  104451                                TRAP    C$DODU
```

```
   964  014610                                    DOCLN
   (3)  014610  104444                            TRAP    C$DCLN
   965
   966  014612                           99$:
   967  014612  000205                            RTS     R5
   968
```

```

                                          .SBTTL  ROUTINE TO CHECK FOR CONTROLLER ERRORS

                                          ;*************************************************************
                                          ;*THIS ROUTINE WILL CHECK RLCS FOR ERRORS AND PRINT THEM
                                          ;*ACCORDINGLY.  IT WILL MERGE THE ERROR PRINTOUT WITH THE TEST
                                          ;*ERROR MESSAGE.
                                          ;*
                                          ;*ROUTINE USES R0,R1 AND PICKS HEADER FROM R3
                                          ;*
                                          ;*        CALL    JSR     R5,CHERR                  ;CHECK CNTLR FOR ERRORS
                                          ;*
                                          ;*
                                          ;*

 014614  005037  002236                   CHERR:  CLR     T.CRC
 014620  032737  176000  002340                   BIT     #176000,E.CS      ;ANY ERROR BITS SET?
 014626  001001                                   BNE     2$                ;YES,FIND OUT WHICH
 014630  000205                                   RTS     R5                ;NO EXIT
 014632  012701  004522                   2$:     MOV     #EM100,R1         ;GET START OF STRING
 014636  005737  002340                           TST     E.CS              ;IS COMPOSITE ERROR SET?(BETTER BE)
 014642  100003                                   BPL     99$               ;IT'S NOT SOMETHING IS WRONG
 014644  004537  015352                           JSR     R5,FIX            ;YES, PUT ''COMP'' IN STRING
 014650  003645                                   COMP                      ;''COMP''
 014652  032737  040000  002340   99$:            BIT     #DERR,E.CS        ;DRIVE ERROR SET?
 014660  001405                                   BEQ     3$                ;NO, CONTINUE
 014662  005237  002422                           INC     DERFLG
 014666  004537  015352                           JSR     R5,FIX            ;YES, PUT ''DRV'' INTO STRING
 014672  003574                                   DEMES                     ;''DRV''
 014674  032737  020000  002340   3$:             BIT     #NXM,E.CS         ;NON-EXISTENT MEMORY ERROR?
 014702  001403                                   BEQ     4$                ;NO, CONTINUE
 014704  004537  015352                           JSR     R5,FIX            ;YES, PUT ''NXM'' INTO STRING
 014710  003601                                   NXMMES                    ;''NXM''
 014712  032737  002000  002340   4$:             BIT     #OPI,E.CS         ;IS OPI SET?
 014720  001422                                   BEQ     6$                ;NO, GO CHECK BITS 11 & 12
 014722  004537  015352                           JSR     R5,FIX            ;PUT ''OPI'' INTO STRING
 014726  003606                                   OPIMES                    ;''OPI''
 014730  032737  004000  002340                   BIT     #BIT11,E.CS       ;HEADERCRC ERROR?
 014736  001403                                   BEQ     5$                ;NO, GO CHECK HEADER NOT FOUND
 014740  004537  015352                           JSR     R5,FIX            ;GO PUT ''HCRC'' IN STRING
 014744  003613                                   HCRCMES                   ;''HCRC''
 014746  032737  010000  002340   5$:             BIT     #BIT12,E.CS       ;HEADER NOT FOUND?
 014754  001424                                   BEQ     8$                ;NO, GO PUT ''CRLF'' IN STRING
 014756  004537  015352                           JSR     R5,FIX            ;PUT ''HNF'' IN STRING
 014762  003621                                   HNFMES                    ;''HNF''
 014764  000420                                   BR      8$                ;PUT ''CRLF'' IN STRING
 014766  032737  004000  002340   6$:             BIT     #BIT11,E.CS       ;DATA CRC ERROR?
 014774  001405                                   BEQ     7$                ;NO, GO CHECK DATA LATE
 014776  005237  002236                           INC     T.CRC
 015002  004537  015352                           JSR     R5,FIX            ;PUT ''DCK'' IN SIRING
 015006  003626                                   DCKMES                    ;''DCK''
 015010  032737  010000  002340   7$:             BIT     #BIT12,E.CS       ;DATA LATE ERROR?
 015016  001403                                   BEQ     8$                ;NO, GO PUT IN ''CRLF''
 015020  004537  015352                           JSR     R5,FIX            ;PUT ''DLT'' IN STRING
 015024  003633                                   DLTMES                    ;''DLT''
 015026  004537  015352                   8$:     JSR     R5,FIX            ;PUT ''CRLF'' INTO STRING
```

```
      015032  003642                           MSCRLF                           ;"CRLF"
      015034  004537  015352                   JSR     R5,FIX                   ;MOVE HEADER
      015040  000000                  RESTMS:  .WORD   0                        ;HEADER FROM TEST
      015042  105011                           CLRB    (R1)                     ;PUT TERMINATOR IN
      015044                                   ERRDF   300.,LF,ERR6
 (4)  015044  104455                           TRAP    C$ERDF
 (5)  015046  000454                           .WORD   300
 (5)  015050  003640                           .WORD   LF
 (5)  015052  007760                           .WORD   ERR6
      015054  000205                           RTS     R5                       ;EXIT ROUTINE

                                      ;*********************************************************************
                                      ;* ROUTINE TO LOAD RLCS WITH FUNCTION TO BE PERFORMED
                                      ;*         CALL:   JSR     R5,LDFUNC                ;LOAD THE FUNCTION IN NEXT WORD
                                      ;*                 .WORD                    ;BITS TO BE LOADED, FUNCTION
                                      ;*                                          ;AND INTR ENABLE ONLY
                                      ;*
                                      ;

      015056  032777  040000  165270  LDFUNC:  BIT     #BIT14,@RLCS     ;DRIVE ERROR SET
      015064  001426                           BEQ     5$
      015066  017737  165266  002334           MOV     @RLDA,B.DA
      015074  012777  000013  165256           MOV     #13,@RLDA
      015102  012737  000200  002330           MOV     #200,B.CS
      015110  053737  002246  002330           BIS     DRIVE,B.CS
      015116  013777  002330  165230           MOV     B.CS,@RLCS
      015124  032777  000200  165222  6$:      BIT     #200,@RLCS
      015132  001774                           BEQ     6$
      015134  013777  002334  165216           MOV     B.DA,@RLDA
      015142  012537  002260          5$:      MOV     (R5)+,LDCSR      ;GET BITS TO LOAD
      015146  010346                           MOV     R3,-(SP)         ;SAVE R3
      015150  042737  177661  002260           BIC     #177661,LDCSR    ;CLEAR ALL BUT FUNC & INTR EN
      015156  013737  002260  002372           MOV     LDCSR,FNDFNC     ;SAVE FUNCTION
      015164  042737  000100  002372           BIC     #INTEN,FNDFNC    ;ONLY FUNCTION
      015172  012703  015312                   MOV     #HDRLST,R3       ;GET HEADER LIST
      015176  006237  002372                   ASR     FNDFNC           ;ALIGN TO LEFT
      015202  001404                           BEQ     2$               ;IF EQUAL TO ZERO, SET R3
      015204  022323                  1$:      CMP     (R3)+,(R3)+      ;BUMP R3 BY 4
      015206  005337  002372                   DEC     FNDFNC           ;DEC FUNCTION
      015212  001374                           BNE     1$               ;FOUND IT? NO-GO BACK
      015214  032737  000100  002260  2$:      BIT     #INTEN,LDCSR     ;YES, DO WE WANT FLAG OR INTR?
      015222  001401                           BEQ     3$               ;FLAG BRANCH
      015224  005723                           TST     (R3)+            ;INTR POINT TO THAT ONE
      015226  011303                  3$:      MOV     (R3),R3          ;SET HEADER
      015230  010337  015040                   MOV     R3,RESTMS        ;SET UP HEADER
      015234  010337  002376                   MOV     R3,TRYFNC        ;SAVE HEADER FOR LATER
      015240  053737  002374  002260           BIS     XMEM,LDCSR       ;LOAD E.A. BITS
      015246  005037  002374                   CLR     XMEM             ;CLEAR OUT THE BITS
      015252  053737  002246  002260           BIS     DRIVE,LDCSR      ;SELECT DRIVE
      015260  052737  000200  002260           BIS     #200,LDCSR
      015266  013777  002260  165060           MOV     LDCSR,@RLCS      ;LOAD FUNCTION
      015274  004537  015364                   JSR     R5,BEFORE        ;READ REGISTERS
      015300  042777  000200  165046  4$:      BIC     #200,@RLCS       ;ISSUE COMMAND
      015306  012603                           MOV     (SP)+,R3         ;RESTORE R3
      015310  000205                           RTS     R5               ;EXIT
```

ROUTINE TO CHECK FOR CONTROLLER ERRORS

```


015312  003705                          HDRLST: NOPMES
015314  003733                                  NOPINT
015316  003762                                  WCKMES
015320  004016                                  WCKINT
015322  004171                                  GSTMES
015324  004221                                  GSTINT
015326  004130                                  SEKMES
015330  004150                                  SEKINT
015332  004053                                  RHDMES
015334  004103                                  RHDINT
015336  004311                                  WRTMES
015340  004332                                  WRTINT
015342  004251                                  RDDMES
015344  004271                                  RDDINT
015346  004353                                  RDNMES
015350  004401                                  RDNINT

                                        ;*********************************************************************
                                        ;*ROUTINE TO MOVE ASCII STRINGS
                                        ;*USES REGISTERS R1 - WHERE STRING IS BEING BUILT
                                        ;*
                                        ;*      CALL    JSR     R5,FIX
                                        ;*              .WORD                   ;ADDRESS OF STRING TO MOVE

015352  012504                          FIX:    MOV     (R5)+,R4                ;GET ADDRESS AND MOVE RETURN
015354  112421                          1$:     MOVB    (R4)+,(R1)+             ;GET BYTE AND UPDATE
015356  001376                                  BNE     1$                      ;WATCH 0 BYTE TERMINATOR
015360  105741                                  TSTB    -(R1)                   ;BACK UP OVER ZERO BYTE
015362  000205                                  RTS     R5                      ;EXIT


                                        ;ROUTINE TO READ REGISTERS PRIOR TO OPERATION
                                        ;CALL:  JSR R5,BEFORE

015364  017737  164764  002330          BEFORE: MOV     @RLCS,B.CS              ;READ CS
015372  017737  164760  002332                  MOV     @RLBA,B.BA              ;     BA
015400  017737  164754  002334                  MOV     @RLDA,B.DA              ;     DA
015406  017737  164750  002336                  MOV     @RLMP,B.MP              ;     MP
015414  000205                                  RTS     R5

                                        ;ROUTINE TO READ REGISTERS AT TIME OF ERROR
                                        ;CALL:  JSR R5,AFTER

015416  017737  164732  002340          AFTER:  MOV     @RLCS,E.CS              ;READ CS
015424  017737  164726  002342                  MOV     @RLBA,E.BA              ;     BA
015432  017737  164722  002344                  MOV     @RLDA,E.DA              ;     DA
015440  017737  164716  002346                  MOV     @RLMP,E.MP              ;     MP
015446  017737  164710  002350                  MOV     @RLMP,E.MP1             ;     MP
015454  017737  164702  002352                  MOV     @RLMP,E.MP2             ;     MP
015462  000205                                  RTS     R5


015464  010046                          SIMBCC: MOV     R0,-(SP)                ;SAVE R0
015466  010146                                  MOV     R1,-(SP)                ;SAVE R1
```

```
     015470  010246                                  MOV     R2,-(SP)               ;SAVE R2
     015472  012537  002304                          MOV     (R5)+,TEMP2            ;GET NUMBER OF BITS
     015476  012537  002306                          MOV     (R5)+,TEMP3            ;GET DATA FOR CRC CALCULATION
     015502  012537  002310                          MOV     (R5)+,TEMP4            ;GET STARTING CRC
     015506  005037  002266          1$:             CLR     BCCFBK                 ;
     015512  013700  002310                          MOV     TEMP4,R0               ;GET PRESENT CRC
     015516  006037  002306                          ROR     TEMP3                  ;ROTATE NEW DATA
     015522  005500                                  ADC     R0                     ;MERGE NEW WITH OLD
     015524  032700  000001                          BIT     #1,R0                  ;BIT 0 SET
     015530  001402                                  BEQ     2$                     ;IF NOT CONTINUE
     015532  005137  002266                          COM     BCCFBK                 ;
     015536  013700  002264          2$:             MOV     XPOLY,R0               ;GET CRC POLYNOMIAL (CRC-16)
     015542  005100                                  COM     R0                     ;COMPLEMENT POLYNOMIAL
     015544  040037  002266                          BIC     R0,BCCFBK
     015550  000241                                  CLC                            ;CLEAR CARRY
     015552  006037  002310                          ROR     TEMP4
     015556  013700  002266                          MOV     BCCFBK,R0
     015562  013701  002310                          MOV     TEMP4,R1
     015566  010102                                  MOV     R1,R2
     015570  040100                                  BIC     R1,R0
     015572  043702  002266                          BIC     BCCFBK,R2
     015576  050200                                  BIS     R2,R0
     015600  043737  002264  002310                  BIC     XPOLY,TEMP4
     015606  050037  002310                          BIS     R0,TEMP4
     015612  005337  002304                          DEC     TEMP2
     015616  001333                                  BNE     1$

     015620  013737  002310  002270                  MOV     TEMP4,CALBCC
     015626  012602                                  MOV     (SP)+,R2
     015630  012601                                  MOV     (SP)+,R1
     015632  012600                                  MOV     (SP)+,R0
     015634  000205                                  RTS     R5                     ;RETURN


                                     ;ROUTINE TO WAIT FOR DRIVE READY




     015636  012701  000144          WTDRDY: MOV     #100.,R1
     015642  032777  000001  164504  1$:     BIT     #DRDY,@RLCS
     015650  001013                          BNE     2$

     015652                                  WAITUS  #20.
     015664  005301                          DEC     R1
     015666  001365                          BNE     1$

     015670                                  ERRDF   200.,DRTIM,ERR5
 (4) 015670  104455                          TRAP    C$ERDF
 (5) 015672  000310                          .WORD   200
 (5) 015674  003546                          .WORD   DRTIM
 (5) 015676  007722                          .WORD   ERR5

     015700  000205                  2$:     RTS     R5

                                     ;ROUTINE TO WAIT FOR CONTROLLER
```

```

      015702  012701  000620          WTCRDY: MOV     #400.,R1
      015706  032777  000200  164440  1$:     BIT     #CRDY,@RLCS
      015714  001016                          BNE     2$

      015716                                  WAITUS  #20.
      015730  005301                          DEC     R1
      015732  001365                          BNE     1$
      015734  004537  015416                  JSR     R5,AFTER

      015740                                  ERRDF   100.,CRTIM,ERR5
 (4)  015740  104455                          TRAP    C$ERDF
 (5)  015742  000144                          .WORD   100
 (5)  015744  003521                          .WORD   CRTIM
 (5)  015746  007722                          .WORD   ERR5
      015750  000205                          RTS     R5

      015752  004537  015416          2$:     JSR     R5,AFTER
      015756  000205                          RTS     R5


      015760  005237  002254          TRPHAN: INC     TRPFLG
      015764  000002                          RTI

      015766                          HDHOME:

      015766                                  BGNSEG                                  ;%%START OF SEGMENT%%
 (3)  015766  104404                          TRAP    C$BSEG
                                      ;ISSUE DRIVE RESET

      015770  012737  000001  002400          MOV     #1,ERFLG              ;SET ERROR FLAG
      015776  012777  000013  164354          MOV     #DRST!MK!GSBIT,@RLDA
      016004  004537  015056                  JSR     R5,LDFUNC                       ;LOAD THE FUNCTION IN NEXT WORD
      016010  000004                          GSTAT
      016012  004537  015702                  JSR     R5,WTCRDY
      016016                                  ESCAPE  SEG                   ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  016016  104410                          TRAP    C$ESCAPE
 (3)  016020  000216                          .WORD   10000$-.
      016022  004537  014614                  JSR     R5,CHERR                        ;CHECK CNTLR FOR ERRORS
      016026                                  ESCAPE  SEG                   ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  016026  104410                          TRAP    C$ESCAPE
 (3)  016030  000206                          .WORD   10000$-.


      016032  004537  015056                  JSR     R5,LDFUNC                       ;LOAD THE FUNCTION IN NEXT WORD
      016036  000010                          RDHDR
      016040                                  ESCAPE  SEG                   ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  016040  104410                          TRAP    C$ESCAPE
 (3)  016042  000174                          .WORD   10000$-.
      016044  004537  015702                  JSR     R5,WTCRDY
      016050                                  ESCAPE  SEG                   ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  016050  104410                          TRAP    C$ESCAPE
 (3)  016052  000164                          .WORD   10000$-.

      016054  004537  014614                  JSR     R5,CHERR                        ;CHECK CNTLR FOR ERRORS
      016060                                  ESCAPE  SEG                   ;CHECK FOR FL:LOE, ELSE EXIT SEG
```

```
(3) 016060  104410                                  TRAP    C$ESCAPE
(3) 016062  000154                                  .WORD   10000$-.

    016064  013737  002346  002272                  MOV     E.MP,TMP0           ;GET HEADER
    016072  042737  000077  002272                  BIC     #77,TMP0
    016100  001424                                  BEQ     99$                 ;SEEK IS NOT NECESSARY
    016102  042737  000100  002272                  BIC     #100,TMP0
    016110  012777  000001  164242                  MOV     #MK,@RLDA           ;SET TO SEEK
    016116  053777  002272  164234                  BIS     TMP0,@RLDA          ;SET IN DIFFERENCE

    016124  004537  015056                          JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
    016130  000006                                  SEEK
    016132  004537  015702                          JSR     R5,WTCRDY
    016136                                          ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3) 016136  104410                                  TRAP    C$ESCAPE
(3) 016140  000076                                  .WORD   10000$-.

    016142  004537  014614                          JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
    016146                                          ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3) 016146  104410                                  TRAP    C$ESCAPE
(3) 016150  000066                                  .WORD   10000$-.

    016152  004537  015056                  99$:    JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
    016156  000010                                  RDHDR
    016160  004537  015702                          JSR     R5,WTCRDY
    016164                                          ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3) 016164  104410                                  TRAP    C$ESCAPE
(3) 016166  000050                                  .WORD   10000$-.
    016170  004537  014614                          JSR     R5,CHERR
    016174                                          ESCAPE  SEG
(3) 016174  104410                                  TRAP    C$ESCAPE
(3) 016176  000040                                  .WORD   10000$-.

    016200  013737  002346  002272                  MOV     E.MP,TMP0                   ;GET HEADER
    016206  043737  002262  002272                  BIC     SECMSK,TMP0                 ;IGNORE SECTOR
    016214  001404                                  BEQ     1$                          ;ON ZERO

    016216                                          ERRDF   400.,SKHOME,ERR0            ;CAN'T SEEK TO TRACK 0
(4) 016216  104455                                  TRAP    C$ERDF
(5) 016220  000620                                  .WORD   400
(5) 016222  004430                                  .WORD   SKHOME
(5) 016224  007510                                  .WORD   ERR0

    016226                                  1$:     ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3) 016226  104410                                  TRAP    C$ESCAPE
(3) 016230  000006                                  .WORD   10000$-.

    016232  005037  002400                          CLR     ERFLG               ;INDICATE SUCCESS BACK TO MAIN PROGRAM


    016236                                          ENDSEG                              ;%%END OF SEGMENT%%
(3) 016236                                  10000$:
(3) 016236  104405                                  TRAP    C$ESEG

    016240  000207                                  RTS     PC
```

```
016242                                          ENDMOD


                                        .SBTTL  **TEST 1** - WRITE FUNCTION

016242                                  BGNTST                                          ;**START OF TEST**



016242                                  STARS
                                        ;;*****************************************************************
                                        ;CHECK OF WRITE LOGIC UNDER FLAG MODE, WE WILL FIRST ISSUE A
                                        ;READ HEADER SO THAT WE DON'T WRITE ON THE BAD SECTOR
                                        ;FILE TRACK.  WE WILL WRITE A FULL SECTOR (128 WORDS) FROM
                                        ;MEMORY (BUF).  WE CHECK THAT NO ERRORS OCCUR.  IF WE
                                        ;HAVE A DRIVE ERROR WE WILL DO A ''GET STATUS'' TO SEE
                                        ;IF WRITE PROTECT IS SET IF IT IS WE WILL ABORT THE
                                        ;TEST.  AN ERROR ON THE WRITE WILL LOOP ON JUST THE
                                        ;WRITE PORTION.  LOOP ON TEST WILL READ HEADER, SEEK (IF
                                        ;NECESSARY) AND WRITE.
016242                                  STARS
                                        ;;*****************************************************************


016242  004737  015766                          JSR     PC,HDHOME       ;HEADS OVER TRACK 0
016246                                          CKERFG                  ;HEADS GO HOME OKAY
016254  104432                                  TRAP    C$EXIT
016256  000126                                  .WORD   L10033-.

016260                                          BGNSEG                          ;%%START OF SEGMENT%%
016260  104404                                  TRAP    C$BSEG

016262                                  3$:
016262  005077  164072                          CLR     @RLDA           ;SET DISK ADDRESS
016266  012777  177600  164066                  MOV     #-128.,@RLMP    ;WORD COUNT
016274  012777  003426  164054                  MOV     #BUF,@RLBA      ;BUS ADDRESS
016302  004537  015056                          JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
016306  000012                                  WRITE                   ;WRITE

016310  004537  015702                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
016314                                          ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
016314  104410                                  TRAP    C$ESCAPE
016316  000064                                  .WORD   10001$-.


016320  032777  040000  164026                  BIT     #DERR,@RLCS     ;DRIVE ERROR SET?
016326  001425                                  BEQ     4$              ;BRANCH IF NOT

016330  012777  000003  164022                  MOV     #MK!GSBIT,@RLDA ;SET GET STATUS OF DRIVE
016336  004537  015056                          JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
016342  000004                                  GSTAT                   ;GET STATUS
016344  004537  015702                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
016350                                          ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
016350  104410                                  TRAP    C$ESCAPE
016352  000030                                  .WORD   10001$-.
```

```
      016354  013737  002346  002300          MOV     E.MP,GDDAT        ;READ DRIVE STATUS
      016362  032737  020000  002300          BIT     #BIT13,GDDAT      ;WRITE LOCK ERROR?
      016370  001404                          BEQ     4$                ;NO, BRANCH


      016372                                  ERRSF   3.,WRLOCK,ERRO            ;WRITE LOCK ERROR
 (4)  016372  104454                          TRAP    C$ERSF
 (5)  016374  000003                          .WORD   3
 (5)  016376  004452                          .WORD   WRLOCK
 (5)  016400  007510                          .WORD   ERRO
      016402                          4$:


      016402                                  ENDSEG                            ;%%END OF SEGMENT%%
 (3)  016402                          10001$:
 (3)  016402  104405                          TRAP    C$ESEG
      016404                          ENDTST                                    ;**END OF TEST**
 (3)  016404                          L10033:
 (3)  016404  104401                          TRAP    C$ETST

                                      .SBTTL  **TEST 2** - WRITE FUNCTION INTERRUPT

      016406                          BGNTST                                    ;**START OF TEST**

      016406                          STARS
 (2)                                  ;;*****************************************************************
                                      ;CHECK OF WRITE LOGIC UNDER INTERRUPT MODE, WE WILL ISSUE A
                                      ;READ HEADER SO THAT WE DON'T WRITE ON THE BAD SECTOR FILE
                                      ;TRACK.  WE WILL WRITE A FULL SECTOR (128 WORDS) FROM MEMORY (BUF).
                                      ;WE CHECK THAT NO ERRORS OCCUR.  WE DO NOT CHECK RLDA OR RLBA
                                      ;INCREMENT AT THIS TIME.
      016406                          STARS
 (2)                                  ;;*****************************************************************


      016406  004737  015766                  JSR     PC,HDHOME         ;HEADS OVER TRACK 0
      016412                                  CKERFG                    ;HEADS GO HOME OKAY
 (4)  016420  104432                          TRAP    C$EXIT
 (4)  016422  000112                          .WORD   L10034-.

      016424                                  BGNSEG                            ;%%START OF SEGMENT%%
 (3)  016424  104404                          TRAP    C$BSEG


      016426  005037  002256                  CLR     INTFLG            ;CLEAR INTERRUPT OCCURANCE FLAG
      016432  005077  163722                  CLR     @RLDA
      016436  012777  177600  163716          MOV     #-128.,@RLMP      ;SET UP WORD COUNT
      016444  012777  003426  163704          MOV     #BUF,@RLBA        ;SET UP BUS ADDRESS

      016452                                  SETPRI  #PRI00            ;PRIORITY TO 0
 (3)  016452  012700  000000                  MOV     #PRI00,R0
 (3)  016456  104441                          TRAP    C$SPRI
      016460  004537  015056                  JSR     R5,LDFUNC                 ;LOAD THE FUNCTION IN NEXT WORD
      016464  000112                          WRITE!INTEN               ;WRITE UNDER INTERRUPT
      016466  004537  015702                  JSR     R5,WTCRDY         ;WAIT FOR INTERRUPT
      016472                                  ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
```

```
   (3)  016472  104410                              TRAP    C$ESCAPE
   (3)  016474  000036                              .WORD   10000$-.
  1355
  1356  016476                                      SETPRI  #PRI07              ;SET PRIORITY TO 7
   (3)  016476  012700  000340                      MOV     #PRI07,R0
   (3)  016502  104441                              TRAP    C$SPRI
  1357  016504  005737  002256                      TST     INTFLG              ;DID INTERRUPT OCCUR?
  1358  016510  001004                              BNE     2$                  ;YES-BRANCH NO-REPORT
  1359
  1360  016512                                      ERRDF   4.,EM17,ERR0        ;WRITE DID NOT INTERRUPT
   (4)  016512  104455                              TRAP    C$ERDF
   (5)  016514  000004                              .WORD   4
   (5)  016516  005322                              .WORD   EM17
   (5)  016520  007510                              .WORD   ERR0
  1361  016522                              2$:     ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  016522  104410                              TRAP    C$ESCAPE
   (3)  016524  000006                              .WORD   10000$-.
  1362
  1363  016526  004537  014614                      JSR     R5,CHERR                        ;CHECK CNTLR FOR ERRORS
  1364
  1365  016532                                      ENDSEG                                  ;%%END OF SEGMENT%%
   (3)  016532                              10000$:
   (3)  016532  104405                              TRAP    C$ESEG
  1366  016534                              ENDTST                                          ;**END OF TEST**
   (3)  016534                              L10034:
   (3)  016534  104401                              TRAP    C$ETST
  1367
  1368                                      .SBTTL  **TEST 3** - PROPER INCREMENT OF RLBA ON WRITE
  1369
  1370  016536                              BGNTST                                          ;**START OF TEST**
  1371
  1372
  1373  016536                              STARS
   (2)                                      ;;*****************************************************************
  1374                                      ;CHECK THAT THE RLBA WILL INCREMENT PROPERLY AFTER THE
  1375                                      ;WRITE WAS FINISHED THE RLBA SHOULD BE 128 WORDS (256 BYTES)
  1376                                      ;CREATER.  STARTING RLBA IS 'BUF'', ENDING SHOULD BE 'BUF + 256.''
  1377                                      ;WE WILL MONITOR ALL ERRORS AND REPORT THEM ACCORDINGLY
  1378  016536                              STARS
   (2)                                      ;;*****************************************************************
  1379
  1380
  1381  016536  004737  015766                      JSR     PC,HDHOME           ;HEADS OVER TRACK 0
  1382  016542                                      CKERFG                      ;HEADS GO HOME OKAY
   (4)  016550  104432                              TRAP    C$EXIT
   (4)  016552  000116                              .WORD   L10035-.
  1383
  1384  016554                                      BGNSEG                                  ;%%START OF SEGMENT%%
   (3)  016554  104404                              TRAP    C$BSEG
  1385
  1386  016556                              3$:
  1387  016556  005077  163576                      CLR     @RLDA
  1388  016562  012777  003426  163566              MOV     #BUF,@RLBA          ;SET UP BUS ADDRESS
  1389  016570  012777  177600  163564              MOV     #-128.,@RLMP        ;WORD COUNT
  1390  016576  012737  003426  002300              MOV     #BUF,GDDAT          ;FORM EXPECTED BUS ADDRESS
  1391  016604  062737  000400  002300              ADD     #256.,GDDAT         ;AFTER WRITE
```

```
      016612  004537  015056                   JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
      016616  000012                           WRITE                   ;WRITE
      016620  004537  015702                   JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
      016624                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  016624  104410                           TRAP    C$ESCAPE
 (3)  016626  000040                           .WORD   10000$-.

      016630  004537  014614                   JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
      016634                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  016634  104410                           TRAP    C$ESCAPE
 (3)  016636  000030                           .WORD   10000$-.
      016640  017737  163512  002302           MOV     @RLBA,BDDAT     ;READ 'RLBA' FOR PRESENT ADDRESS
      016646  023737  002302  002300           CMP     BDDAT,GDDAT     ;DID 'BA' INCREMENT PROPERLY?
      016654  001404                           BEQ     2$              ;YES, CONTINUE

      016656                                   ERRDF   5.,EM20,ERR4    ;BA DID NOT INCREMENT
 (4)  016656  104455                           TRAP    C$ERDF
 (5)  016660  000005                           .WORD   5
 (5)  016662  005346                           .WORD   EM20
 (5)  016664  007654                           .WORD   ERR4

      016666                           2$:

      016666                                   ENDSEG                          ;%%END OF SEGMENT%%
 (3)  016666                           10000$:
 (3)  016666  104405                           TRAP    C$ESEG
      016670                           ENDTST                                  ;**END OF TEST**
 (3)  016670                           L10035:
 (3)  016670  104401                           TRAP    C$ETST

                                       .SBTTL  **TEST 4** - PROPER INCREMENT OF RLDA ON WRITE

      016672                           BGNTST                                  ;**START OF TEST**

      016672                           STARS
 (2)                                   ;;*************************************************************
                                       ;CHECK THAT THE SECTOR INCREMENTS AFTER THE WRITE WAS FINISHED.
                                       ;WE RANDOMLY PICK A SECTOR (OTHER THAN LAST TRACK) AND ISSUE
                                       ;A FULL SECTOR WRITE THE RLDA SHOULD REFLECT AN INCREMENT
                                       ;OF THE SECOTR.  'GDDAT' WAS THE EXPECTED RLDA.
      016672                           STARS
 (2)                                   ;;*************************************************************


      016672  004737  015766                   JSR     PC,HDHOME       ;HEADS OVER TRACK 0
      016676                                   CKERFG                  ;HEADS GO HOME OKAY
 (4)  016704  104432                           TRAP    C$EXIT
 (4)  016706  000114                           .WORD   L10036-.

      016710                                   BGNSEG                          ;%%START OF SEGMENT%%
 (3)  016710  104404                           TRAP    C$BSEG

      016712                           3$:
      016712  005037  002300                   CLR     GDDAT
      016716  013777  002300  163434           MOV     GDDAT,@RLDA     ;SETUP DISK ADDRESS
 1431  016724  005237  002300                   INC     GDDAT           ;CREATE EXPECTED SECTOR
 1432  016730  012777  177600  163424           MOV     #-128.,@RLMP    ;WORD COUNT
 1433  016736  012777  003426  163412           MOV     #BUF,@RLBA      ;SETUP BUS ADDRESS
 1434
 1435  016744  004537  015056                   JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
 1436  016750  000012                           WRITE                   ;WRITE
 1437  016752  004537  015702                   JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
 1438  016756                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  016756  104410                           TRAP    C$ESCAPE
  (3)  016760  000040                           .WORD   10000$-.
 1439
 1440  016762  004537  014614                   JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
 1441  016766                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  016766  104410                           TRAP    C$ESCAPE
  (3)  016770  000030                           .WORD   10000$-.
 1442
 1443  016772  013737  002344  002302           MOV     F.DA,BDDAT      ;READ DISK ADDRESS
 1444  017000  023737  002300  002302           CMP     GDDAT,BDDAT     ;DID SECTOR INCREMENT PROPERLY
 1445  017006  001404                           BEQ     2$              ;YES, BRANCH  NO, REPORT ERROR
 1446
 1447  017010                                   ERRDF   6.,EM21,ERR4    ;DA DID NOT INCREMENT
  (4)  017010  104455                           TRAP    C$ERDF
  (5)  017012  000006                           .WORD   6
  (5)  017014  005414                           .WORD   EM21
  (5)  017016  007654                           .WORD   ERR4
 1448
 1449  017020                           2$:
 1450
 1451  017020                                   ENDSEG                          ;%%END OF SEGMENT%%
  (3)  017020                           10000$:
  (3)  017020  104405                           TRAP    C$ESEG
 1452  017022                           ENDTST                                  ;**END OF TEST**
  (3)  017022                           L10036:
  (3)  017022  104401                           TRAP    C$ETST
 1453
 1454                                   .SBTTL  **TEST 5** - FORCE HEADER NOT FOUND WITH WRITE
 1455
 1456  017024                           BGNTST                                  ;**START OF TEST**
 1457
 1458  017024                           STARS
  (2)                                   ;;*****************************************************************
 1459                                   ;FORCE HEADER NOT FOUND ERROR TO OCCUR.  THIS IS DONE
 1460                                   ;BY SETTING SECTOR 40 OF THE RLDA AND ISSUING A
 1461                                   ;WRITE.  SECTOR 40 DOES NOT EXIST ON THE RL01 PACK
 1462                                   ;THEREFORE HDR NT FOUND SHOULD SET.
 1463  017024                           STARS
  (2)                                   ;;*****************************************************************
 1464
 1465  017024  004737  015766                   JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 1466  017030                                   CKERFG                  ;HEADS GO HOME OKAY
  (4)  017036  104432                           TRAP    C$EXIT
  (4)  017040  000120                           .WORD   L10037-.
 1467
 1468  017042                                   BGNSEG                          ;%%START OF SEGMENT%%
  (3)  017042  104404                           TRAP    C$BSEG
 1469
 1470
 1471  017044  012777  000050  163306          MOV     #40.,@RLDA        ;INSURE NOT TO FIND HEADER BY
 1472  017052  012777  003426  163276          MOV     #BUF,@RLBA        ;SETTING SECTOR 40 OF CYL. ADDR.
 1473  017060  012777  177777  163274          MOV     #-1,@RLMP         ;WORD COUNT
 1474
 1475  017066  004537  015056                  JSR     R5,LDFUNC                 ;LOAD THE FUNCTION IN NEXT WORD
 1476  017072  000012                          WRITE                     ;WRITE
 1477  017074  004537  015702                  JSR     R5,WTCRDY         ;WAIT FOR CONTROLLER READY
 1478  017100                                  ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  017100  104410                          TRAP    C$ESCAPE
  (3)  017102  000054                          .WORD   10000$-.
 1479
 1480  017104  013737  002340  002272          MOV     E.CS,TMPO         ;GET RLCS
 1481  017112  042737  001777  002272          BIC     #1777,TMPO        ;SAVE ERROR BITS
 1482  017120  022737  112000  002272          CMP     #BIT15!BIT12!BIT10,TMPO  ;HDR NOT FOUND SET.
 1483  017126  001402                          BEQ     1$                ;YES, CONTINUE
 1484
 1485  017130  004537  014614                  JSR     R5,CHERR
 1486  017134                          1$:     CKLOOP
  (3)  017134  104406                          TRAP    C$CLP1
 1487
 1488  017136  022737  112000  002272          CMP     #BIT15!BIT12!BIT10,TMPO
 1489  017144  001404                          BEQ     2$
 1490  017146                                  ERRDF   23.,EM10,ERRO
  (4)  017146  104455                          TRAP    C$ERDF
  (5)  017150  000027                          .WORD   23
  (5)  017152  005064                          .WORD   EM10
  (5)  017154  007510                          .WORD   ERRO
 1491                                                                    ;WHEN FORCED
 1492  017156                          2$:
 1493
 1494  017156                                  ENDSEG                            ;%%END OF SEGMENT%%
  (3)  017156                          10000$:
  (3)  017156  104405                          TRAP    C$ESEG
 1495  017160                          ENDTST                                    ;**END OF TEST**
  (3)  017160                          L10037:
  (3)  017160  104401                          TRAP    C$ETST
 1496
 1497                                  .SBTTL  **TEST 6** - FORCE HEADER NOT FOUND WITH WRITE INTERRUPT
 1498
 1499  017162                          BGNTST                                    ;**START OF TEST**
 1500
 1501
 1502  017162                          STARS
  (2)                                  ;;*******************************************************************
 1503                                  ;TEST THAT HEADER NOT FOUND ERROR WILL GENERATE AN INTERRUPT
 1504                                  ;ON OCCURRENCE.  HEADER NOT FOUND WILL BE FORCED BY SETTING
 1505                                  ;SECTOR 40 OF RLDA AND ISSUEING A WRITE
 1506  017162                          STARS
  (2)                                  ;;*******************************************************************
 1507
 1508
 1509  017162  004737  015766                  JSR     PC,HDHOME         ;HEADS OVER TRACK 0
 1510  017166                                  CKERFG                    ;HEADS GO HOME OKAY
  (4)  017174  104432                          TRAP    C$EXIT
  (4)  017176  000160                          .WORD   L10040-.
 1511
 1512  017200                                      BGNSEG                               ;%%START OF SEGMENT%%
  (3)  017200  104404                              TRAP     C$BSEG
 1513
 1514  017202                                      SETPRI   #PRI00
  (3)  017202  012700  000000                      MOV      #PRI00,R0
  (3)  017206  104441                              TRAP     C$SPRI
 1515  017210  005037  002256                      CLR      INTFLG             ;CLEAR INTERRUPT OCCURANCE FLAG
 1516  017214  012777  000050  163136              MOV      #40.,@RLDA         ;INSURE NOT TO FIND HEADER BY
 1517  017222  012777  003426  163126              MOV      #BUF,@RLBA         ;SETTING SECTOR 40 OF CYL. ADDR.
 1518  017230  012777  177777  163124              MOV      #-1,@RLMP          ;WORD COUNT
 1519
 1520  017236  004537  015056                      JSR      R5,LDFUNC                    ;LOAD THE FUNCTION IN NEXT WORD
 1521  017242  000112                              WRITE!INTEN                 ;WRITE
 1522  017244  004537  015702                      JSR      R5,WTCRDY          ;WAIT FOR CONTROLLER READY
 1523  017250                                      CKLOOP
  (3)  017250  104406                              TRAP     C$CLP1
 1524  017252                                      SETPRI   #PRI07
  (3)  017252  012700  000340                      MOV      #PRI07,R0
  (3)  017256  104441                              TRAP     C$SPRI
 1525
 1526  017260  005737  002256                      TST      INTFLG             ;DID INTERRUPT OCCUR
 1527  017264  001004                              BNE      2$                 ;YES OKAY
 1528
 1529  017266                                      ERRDF    24.,EM43,ERR0      ;NO INTERRUPT FROM OPI
  (4)  017266  104455                              TRAP     C$ERDF
  (5)  017270  000030                              .WORD    24
  (5)  017272  006461                              .WORD    EM43
  (5)  017274  007510                              .WORD    ERR0
 1530
 1531  017276                              2$:     ESCAPE   SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  017276  104410                              TRAP     C$ESCAPE
  (3)  017300  000054                              .WORD    10000$-.
 1532
 1533
 1534  017302  013737  002340  002272              MOV      E.CS,TMP0          ;GET RLCS
 1535  017310  042737  001777  002272              BIC      #1777,TMP0         ;SAVE ERROR BITS
 1536  017316  022737  112000  002272              CMP      #BIT15!BIT12!BIT10,TMP0   ;WDR NOT FOUND SET.
 1537  017324  001402                              BEQ      1$                 ;YES, CONTINUE
 1538
 1539  017326  004537  014614                      JSR      R5,CHERR
 1540  017332                              1$:     CKLOOP
  (3)  017332  104406                              TRAP     C$CLP1
 1541
 1542  017334  022737  112000  002272              CMP      #BIT15!BIT12!BIT10,TMP0
 1543  017342  001404                              BEQ      3$
 1544  017344                                      ERRDF    25.,EM10,ERR0
  (4)  017344  104455                              TRAP     C$ERDF
  (5)  017346  000031                              .WORD    25
  (5)  017350  005064                              .WORD    EM10
  (5)  017352  007510                              .WORD    ERR0
 1545                                                                          ;WHEN FORCED
 1546  017354                              3$:
 1547
 1548  017354                                      ENDSEG                               ;%%END OF SEGMENT%%
  (3)  017354                              10000$:
```

```
  (3)  017354  104405                          TRAP    C$ESEG
 1549  017356                          ENDTST                                  ;**END OF TEST**
  (3)  017356                          L10040:
  (3)  017356  104401                          TRAP    C$ETST
 1550
 1551
 1552
 1553                                  .SBTTL  **TEST 7** - CHECK OPI TIME WITH HDR NT FND
 1554
 1555  017360                          BGNTST                                  ;**START OF TEST**
 1556
 1557  017360                          STARS
  (2)                                  ;;***************************************************************************
 1558                                  ;CHECK OPI TIME IT SHOULD BE AROUND 200 MILLISECONDS (ON UNIBUS)
 1559                                  ;CHECK THIS BY TIMING OPI ON A FORCED HEADER NOT FOUND
 1560                                  ;ISSUE WRITE WITH SECTOR 40 SET IN THE DISK ADDRESS
 1561  017360                          STARS
  (2)                                  ;;***************************************************************************
 1562
 1563  017360  004737  014062                  JSR     PC,SETCLK       ;CALL INITIALIZE CLOCK ROUTINE
 1564  017364  005737  002652                  TST     XITFLG          ;EXIT?
 1565  017370  001412                          BEQ     1$              ;BRANCH - IF NO
 1566  017372                                  PRINTB  #FRMT18         ;ELSE, PRINT MSG. 'TEST 7 CANNOT BE PERFORMED...
  (7)  017372  012746  012316                  MOV     #FRMT18,-(SP)
  (6)  017376  012746  000001                  MOV     #1,-(SP)
  (3)  017402  010600                          MOV     SP,R0
  (4)  017404  104414                          TRAP    C$PNTB
  (4)  017406  062706  000004                  ADD     #4,SP
 1567                                                                  ;/CLOCK IS NOT AVAILABLE''
 1568  017412  000137  017764                  JMP     8$              ;EXIT
 1569  017416  004737  015766          1$:     JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 1570  017422                                  CKERFG                  ;HEADS GO HOME OKAY
  (4)  017430  104432                          TRAP    C$EXIT
  (4)  017432  000346                          .WORD   L10041-.
 1571
 1572  017434                                  BGNSEG                  ;%%START OF SEGMENT%%
  (3)  017434  104404                          TRAP    C$BSEG
 1573
 1574  017436                                  CLRVEC  BVEC            ;CLEAR PRESENT INTERRUPT VECTOR
  (3)  017436  013700  002366                  MOV     BVEC,R0
  (3)  017442  104436                          TRAP    C$CVEC
 1575  017444                                  SETVEC  BVEC,#TIMSRV,#340       ;SET INTR. VEC. WITH DISABLE CLOCK
  (7)  017444  012746  000340                  MOV     #340,-(SP)
  (6)  017450  012746  014474                  MOV     #TIMSRV,-(SP)
  (5)  017454  013746  002366                  MOV     BVEC,-(SP)
  (4)  017460  012746  000003                  MOV     #3,-(SP)
  (3)  017464  104437                          TRAP    C$SVEC
  (2)  017466  062706  000010                  ADD     #10,SP
 1576  017472                                  SETPRI  #PRI00
  (3)  017472  012700  000000                  MOV     #PRI00,R0
  (3)  017476  104441                          TRAP    C$SPRI
 1577  017500  005037  002256                  CLR     INTFLG          ;CLEAR INTERRUPT FLAG
 1578  017504  012777  000050  162646          MOV     #40.,@RLDA      ;SET UP FOR HDR NT FND
 1579  017512  012777  003426  162636          MOV     #BUF,@RLBA      ;BUS ADDRESS
 1580  017520  012777  177777  162634          MOV     #-1,@RLMP       ;WORD COUNT
 1581  017526  013737  002664  002302          MOV     OPITIM,BDDAT    ;GET OPIMX FOR WORST CASE
 1582  017534  013701  002644                   MOV     PCSR,R1            ;GET CSR
 1583  017540  005737  002660                   TST     PCLOCK             ;USING THE P-CLOCK?
 1584  017544  001404                           BEQ     6$                 ;BRANCH - IF NO
 1585  017546  012711  000014                   MOV     #14,(R1)           ;SET P-CLOCK,  REPEAT-INT,LINE FREQ.
 1586  017552  005061  000002                   CLR     2(R1)              ;INIT COUNT BUFFER REGISTER
 1587  017556  004537  015056           6$:     JSR     R5,LDFUNC          ;LOAD THE FUNCTION IN THE NEXT WORD
 1588  017562  000112                           WRITE!INTEN                ;WRITE UNDER INTERRUPT
 1589  017564  013700  002664                   MOV     OPITIM,RO          ;GET OPIMX TO CALCULATE TIME EXPIRED
 1590  017570  052711  000101                   BIS     #101,(R1)          ;ENABLE CLOCK
 1591  017574  005737  002664           40$:    TST     OPITIM             ;COUNT EXPIRED?
 1592  017600  001446                           BEQ     4$                 ;BRANCH - IF YES
 1593  017602  005737  002256                   TST     INTFLG             ;INTERRUPT OCCURED?
 1594  017606  001772                           BEQ     40$                ;BRANCH - IF NO
 1595  017610  005437  002664                   NEG     OPITIM             ;GET NEGATIVE OF FACTOR FOR SUBTRACTION
 1596  017614  060037  002664                   ADD     RO,OPITIM          ;SUBTRACT PASSING TIME FROM ORIGINAL
 1597  017620  013700  002664                   MOV     OPITIM,RO          ;GET TIME EXPIRED
 1598  017624  005737  002656                   TST     SIXTY              ;60 HZ.?
 1599  017630  001405                           BEQ     9$                 ;BRANCH - IF NO
 1600  017632  006300                           ASL     RO                 ;MULTIPLY BY 16(10)
 1601  017634  006300                           ASL     RO                 ;FOR
 1602  017636  006300                           ASL     RO                 ;60 HZ.
 1603  017640  006300                           ASL     RO                 ;CASE
 1604  017642  000410                           BR      2$                 ;EXIT
 1605  017644  006300                   9$:     ASL     RO                 ;MULTIPLY BY 20(10)
 1606  017646  006300                           ASL     RO                 ;FOR
 1607  017650  006300                           ASL     RO                 ;THE
 1608  017652  006300                           ASL     RO                 ;50 HZ.
 1609  017654  063700  002664                   ADD     OPITIM,RO          ;CASE
 1610  017660  063700  002664                   ADD     OPITIM,RO          ;STOP HERE
 1611
 1612                                   ;CHECK THAT OPI TIME IS WITHIN LIMITS
 1613
 1614  017664  010037  002302           2$:     MOV     RO,BDDAT           ;SAVE EXPIRED TIME
 1615  017670                                   SETPRI  #PRI07
  (3)  017670  012700  000340                   MOV     #PRI07,RO
  (3)  017674  104441                           TRAP    C$SPRI
 1616  017676  023737  002414  002302           CMP     OPIMX,BDDAT        ;IS IT WITHIN LIMITS
 1617  017704  002404                           BLT     4$                 ;NO, REPORT ERROR
 1618  017706  023737  002412  002302           CMP     OPIMN,BDDAT        ;WITHIN LIMITS
 1619  017714  003404                           BLE     5$                 ;YES
 1620  017716                           4$:     ERRDF   974.,EM56,ERR13 ;OPI TIMING INCORRECT
  (4)  017716  104455                           TRAP    C$ERDF
  (5)  017720  001716                           .WORD   974
  (5)  017722  007033                           .WORD   EM56
  (5)  017724  010346                           .WORD   ERR13
 1621  017726                           5$:     CLRVEC  BVEC               ;CLEAR PRESENT VECTOR
  (3)  017726  013700  002366                   MOV     BVEC,RO
  (3)  017732  104436                           TRAP    C$CVEC
 1622  017734                                   SETVEC  BVEC,#INTSRV,#340        ;SET IN OLD VECTOR
  (7)  017734  012746  000340                   MOV     #340,-(SP)
  (6)  017740  012746  014466                   MOV     #INTSRV,-(SP)
  (5)  017744  013746  002366                   MOV     BVEC,-(SP)
  (4)  017750  012746  000003                   MOV     #3,-(SP)
  (3)  017754  104437                           TRAP    C$SVEC
  (2)  017756  062706  000010                   ADD     #10,SP
 1623  017762                                   ENDSEG                     ;%%END OF SEGMENT%%
```

```
  (3)  017762                              10000$:
  (3)  017762  104405                               TRAP    C$ESEG
 1624  017764  005037  002652              8$:      CLR     XITFLG              ;INIT EXIT FLAG
 1625  017770  005037  002656                       CLR     SIXTY               ;INIT 60 HZ. FLAG
 1626  017774  005037  002660                       CLR     PCLOCK              ;INIT PCLOCK INDICATOR
 1627
 1628  020000                              ENDTST                               ;**END OF TEST**
  (3)  020000                              L10041:
  (3)  020000  104401                               TRAP    C$ETST
 1629
 1630
 1631                                      .SBTTL  **TEST 8** - MULTIPLE SECTOR TRANSFER ON WRITE
 1632
 1633  020002                              BGNTST                                         ;**START OF TEST**
 1634
 1635  020002                              STARS
  (2)                                      ;;*******************************************************************
 1636                                      ;CHECK FOR MULTIPLE SECTOR TRANSFER ON WRITE. THIS TEST CHECKS
 1637                                      ;THAT TWO SECTORS CAN BE SUCCESSFULLY WRITTEN.  WE LOAD
 1638                                      ;A WORD COUNT OF 129 WORDS (ONE SECTOR + 1 WORD) STARTING AT
 1639                                      ;SECTOR 0 THRU SECTOR 37 AND VERIFY THAT THE RLDA DOES
 1640                                      ;A DOUBLE INCREMENT EACH TIME.
 1641  020002                              STARS
  (2)                                      ;;*******************************************************************
 1642
 1643
 1644
 1645  020002  004737  015766                       JSR     PC,HDHOME           ;HEADS OVER TRACK 0
 1646  020006                                       CKERFG                      ;HEADS GO HOME OKAY
  (4)  020014  104432                               TRAP    C$EXIT
  (4)  020016  000152                               .WORD   L10042-.
 1647
 1648  020020  005037  002272                       CLR     TMP0                ;CLEAR TEMP LOCATIONS
 1649  020024  005037  002274                       CLR     TMP1
 1650
 1651  020030                                       BGNSEG                                ;%%START OF SEGMENT%%
  (3)  020030  104404                               TRAP    C$BSEG
 1652
 1653
 1654  020032  013737  002274  002300  1$:      MOV     TMP1,GDDAT          ;GET CYLINDER
 1655  020040  053737  002272  002300           BIS     TMP0,GDDAT          ;GET SECTOR
 1656  020046  013777  002300  162304           MOV     GDDAT,@RLDA         ;SET DISK ADDRESS-SECTOR 0
 1657  020054  062737  000002  002300           ADD     #2,GDDAT            ;SET EXPECTED + 2
 1658  020062  012777  003426  162266           MOV     #BUF,@RLBA          ;SET BUS ADDRESS
 1659  020070  012777  177577  162264           MOV     #-129.,@RLMP        ;WORD COUNT-SECTOR+1 WORD
 1660
 1661  020076  004537  015056                       JSR     R5,LDFUNC                     ;LOAD THE FUNCTION IN NEXT WORD
 1662  020102  000012                               WRITE                       ;WRITE
 1663  020104  004537  015702                       JSR     R5,WTCRDY           ;WAIT FOR CONTROLLER READY?
 1664  020110                                       ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  020110  104410                               TRAP    C$ESCAPE
  (3)  020112  000054                               .WORD   10000$-.
 1665
 1666  020114  004537  014614                       JSR     R5,CHERR                      ;CHECK CNTLR FOR ERRORS
 1667  020120                                       ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  020120  104410                               TRAP    C$ESCAPE
```

```
   (3)  020122  000044                              .WORD   10000$-.
  1668
  1669  020124  013737  002344  002302              MOV     E.DA,BDDAT          ;READ DISK ADDRESS
  1670  020132  023737  002302  002300              CMP     BDDAT,GDDAT         ;IS DISK ADDRESS CORRECT
  1671  020140  001404                              BEQ     2$                  ;YES, BRANCH  NO, REPORT ERROR
  1672
  1673  020142                                      ERRDF   7.,EM22,ERR4        ;DISK ADDRESS NOT CORRECT
   (4)  020142  104455                              TRAP    C$ERDF
   (5)  020144  000007                              .WORD   7
   (5)  020146  005461                              .WORD   EM22
   (5)  020150  007654                              .WORD   ERR4
  1674
  1675  020152                              2$:
  1676
  1677  020152  005237  002272                      INC     TMPO                ;NEXT SECTOR
  1678  020156  022737  000046  002272              CMP     #46,TMPO            ;AT END?
  1679  020164  001322                              BNE     1$                  ;NO, GO BACK
  1680
  1681  020166                                      ENDSEG                                ;%%END OF SEGMENT%%
   (3)  020166                              10000$:
   (3)  020166  104405                              TRAP    C$ESEG
  1682  020170                              ENDTST                                        ;**END OF TEST**
   (3)  020170                              L10042:
   (3)  020170  104401                              TRAP    C$ETST
  1683
  1684                                      .SBTTL  **TEST 9** - CHECK DIRECTION OF WRITE NPR
  1685
  1686  020172                              BGNTST                                        ;**START OF TEST**
  1687
  1688  020172                              STARS
   (2)                                      ;;*************************************************************
  1689                                      ;VERIFY THAT A WRITE IS WRITING NOT READING.  WE WRITE A
  1690                                      ;KNOWN PATTERN IN 'BUF'' (128 WORD), WE THEN ISSUE A WRITE.
  1691                                      ;ONCE THE WRITE IS FINISHED WE CHECK THAT 'BUF'' IS INTACT.
  1692                                      ;THIS IS DONE TO PROVE THAT THE NPR IS GOING THE RIGHT
  1693                                      ;WAY.
  1694  020172                              STARS
   (2)                                      ;;*************************************************************
  1695
  1696
  1697  020172  004737  015766                      JSR     PC,HDHOME           ;HEADS OVER TRACK 0
  1698  020176                                      CKERFG                      ;HEADS GO HOME OKAY
   (4)  020204  104432                              TRAP    C$EXIT
   (4)  020206  000160                              .WORD   L10043-.
  1699
  1700  020210                                      BGNSEG                                ;%%START OF SEGMENT%%
   (3)  020210  104404                              TRAP    C$BSEG
  1701
  1702  020212                              2$:
  1703  020212  012702  003426                      MOV     #BUF,R2             ;WRITE BUFFER FOR WRITE OPERATION
  1704  020216  012701  000200                      MOV     #128.,R1            ;ONE SECTOR'S WORTH
  1705  020222  012722  125252              3$:     MOV     #125252,(R2)+       ;WRITE BUFFER
  1706  020226  005301                              DEC     R1                  ;DONE?
  1707  020230  001374                              BNE     3$                  ;NO, GO BACK
  1708
  1709  020232  005077  162122                      CLR     @RLDA               ;LOAD DISK ADDRESS
```

```
 1710  020236  012777  177600  162116              MOV     #-128.,@RLMP       ;WORD COUNT
 1711  020244  012777  003426  162104              MOV     #BUF,@RLBA         ;BUS ADDRESS
 1712  020252  004537  015056                      JSR     R5,LDFUNC                    ;LOAD THE FUNCTION IN NEXT WORD
 1713  020256  000012                              WRITE                      ;WRITE SOME DATA
 1714  020260  004537  015702                      JSR     R5,WTCRDY          ;WAIT FOR IT TO FINISH
 1715  020264                                      ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  020264  104410                              TRAP    C$ESCAPE
  (3)  020266  000076                              .WORD   10000$-.
 1716
 1717  020270  004537  014614                      JSR     R5,CHERR                     ;CHECK CNTLR FOR ERRORS
 1718  020274                                      ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  020274  104410                              TRAP    C$ESCAPE
  (3)  020276  000066                              .WORD   10000$-.
 1719
 1720  020300  012702  003426                      MOV     #BUF,R2            ;SET UP TO CHECK BUFFER
 1721  020304  012701  000200                      MOV     #128.,R1           ;CHECK 128 WORDS
 1722
 1723  020310                                      BGNSEG                                 ;%%START OF SEGMENT%%
  (3)  020310  104404                              TRAP    C$BSEG
 1724
 1725  020312  012737  125252  002300              MOV     #125252,GDDAT      ;DATA SHOULD BE 125252
 1726  020320  011237  002302            4$:       MOV     (R2),BDDAT         ;LOAD DATA INTO BDDAT
 1727  020324  023737  002300  002302              CMP     GDDAT,BDDAT        ;IS IT OKAY?
 1728  020332  001406                              BEQ     5$                 ;YES, CONTINUE
 1729
 1730  020334  010237  002274                      MOV     R2,TMP1 ;LOAD MEMORY LOCATION OF FAILURE
 1731  020340                                      ERRDF   8.,EM26,ERR8
  (4)  020340  104455                              TRAP    C$ERDF
  (5)  020342  000010                              .WORD   8
  (5)  020344  005710                              .WORD   EM26
  (5)  020346  010030                              .WORD   ERR8
 1732
 1733  020350                            5$:       ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  020350  104410                              TRAP    C$ESCAPE
  (3)  020352  000010                              .WORD   10001$-.
 1734  020354  005722                    6$:       TST     (R2)+              ;NEXT!
 1735  020356  005301                              DEC     R1                 ;DONE?
 1736  020360  001357                              BNE     4$                 ;NO, GO BACK
 1737
 1738  020362                                      ENDSEG                                 ;%%END OF SEGMENT%%
  (3)  020362                            10001$:
  (3)  020362  104405                              TRAP    C$ESEG
 1739  020364                                      ENDSEG                                 ;%%END OF SEGMENT%%
  (3)  020364                            10000$:
  (3)  020364  104405                              TRAP    C$ESEG
 1740  020366                            ENDTST                                           ;**END OF TEST**
  (3)  020366                            L10043:
  (3)  020366  104401                              TRAP    C$ETST
 1741
 1742                                    .SBTTL  **TEST 10** - CHECK FULL RLBA INCREMENT
 1743
 1744  020370                            BGNTST                                           ;**START OF TEST**
 1745
 1746  020370                            $TARS
  (2)                                    ;;*****************************************************************
 1747                                    ;TEST THAT THE RLBA WILL INCREMENT, WE DO NOT DO A FULL 16
```

```
                                        ;BIT INCREMENT WE CHECK THAT EACH BIT WILL TOGGLE 0 TO 1
                                        ;AND 1 TO 0.  WE DO CHECK ALL BITS EVEN IF ALL MEMORY
                                        ;IS NOT AVAILABLE.  (WE IGNORE NON-EXISTANT MEMORY ERRORS).
                                        ;WE USE THE SAME DISK ADDRESS (RANDOM) AND A 1 WORD TRANSFER.
020370                                  STARS
                                        ;;*****************************************************************


020370  004737  015766                          JSR     PC,HDHOME       ;HEADS OVER TRACK 0
020374                                          CKERFG                  ;HEADS GO HOME OKAY
020402  104432                                  TRAP    C$EXIT
020404  000134                                  .WORD   L10044-.
                                                        .

020406  005037  002274                          CLR     TMP1            ;CLEAR LOCATION

020412                                          BGNSEG                          ;%%START OF SEGMENT%%
020412  104404                                  TRAP    C$BSEG

020414                                  3$:
020414  012777  177777  161740                  MOV     #-1,@RLMP       ;ONLY ONE (1) WORD
020422  005077  161732                          CLR     @RLDA           ;LOAD DISK ADDRESS
020426  013777  002274  161722                  MOV     TMP1,@RLBA      ;BUS ADDRESS

020434  004537  015056                          JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
020440  000012                                  WRITE
020442  004537  015702                          JSR     R5,WTCRDY       ;WAIT FOR WRITE TO FINISH
020446                                          ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
020446  104410                                  TRAP    C$ESCAPE
020450  000066                                  .WORD   10000$-.

020452  013737  002274  002300          4$:     MOV     TMP1,GDDAT      ;SET UP EXPECTED RLBA
020460  062737  000002  002300                  ADD     #2,GDDAT        ;PREVIOUS RLBA+2
020466  013737  002342  002302                  MOV     E.BA,BDDAT      ;READ RLBA
020474  023737  002300  002302                  CMP     GDDAT,BDDAT     ;WAS IT UPDATED PROPERLY?
020502  001404                                  BEQ     5$              ;YES, CONTINUE

020504                                          ERRDF   9.,EM30,ERR4    ;BA INCREMENT ERROR
020504  104455                                  TRAP    C$ERDF
020506  000011                                  .WORD   9
020510  006005                                  .WORD   EM30
020512  007654                                  .WORD   ERR4
020514                                  5$:     ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
020514  104410                                  TRAP    C$ESCAPE
020516  000020                                  .WORD   10000$-.

020520  006337  002274                          ASL     TMP1            ;NEXT PATTERN TO TEST RLBA
020524  103404                                  BCS     6$              ;DONE?
020526  052737  000002  002274                  BIS     #BIT1,TMP1      ;NO, SET IN BIT 1
020534  000727                                  BR      3$              ;GO CHECK NEXT.

020536                                  6$:                             ;END TEST

020536                                          ENDSEG                          ;%%END OF SEGMENT%%
020536                                  10000$:
020536  104405                                  TRAP    C$ESEG
```

```
      020540                                   ENDTST                                            ;**END OF TEST**
 (3)  020540                                   L10044:
 (3)  020540  104401                                     TRAP     C$ETST

                                               .SBTTL   **TEST 11** - BA BIT 16 INCREMENT

      020542                                   BGNTST                                            ;**START OF TEST**

      020542                                   STARS
 (2)                                           ;;*****************************************************************
                                               ;CHECK THAT BA BIT 16 WILL INCREMENT.  WE WILL LOAD THE
                                               ;RLBA WITH 177776 AND ISSUE A ONE WORD WRITE WE THEN
                                               ;CHECK BA BIT 16 TO SET, BA 17 TO STAY A 0 AND THE RLBA
                                               ;TO GO TO ZERO
      020542                                   STARS
 (2)                                           ;;*****************************************************************


      020542  004737  015766                             JSR      PC,HDHOME        ;HEADS OVER TRACK 0
      020546                                             CKERFG                    ;HEADS GO HOME OKAY
 (4)  020554  104432                                     TRAP     C$EXIT
 (4)  020556  000160                                     .WORD    L10045-.

      020560                                             BGNSEG                              ;%%START OF SEGMENT%%
 (3)  020560  104404                                     TRAP     C$BSEG

      020562                                   2$:
      020562  012777  177776  161566                     MOV      #177776,@RLBA    ;SET MAX BA TO INC. BA16
      020570  005037  002374                             CLR      XMEM             ;WE DON'T WANT TO LOAD ANY EA
      020574  012777  177777  161560                     MOV      #-1,@RLMP        ;ONE WORD TRANSFER
      020602  005077  161552                             CLR      @RLDA
      020606  004537  015056                             JSR      R5,LDFUNC                  ;LOAD THE FUNCTION IN NEXT WORD
      020612  000012                                     WRITE
      020614  004537  015702                             JSR      R5,WTCRDY        ;WAIT FOR WRITE TO FINISH
      020620                                             ESCAPE   SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  020620  104410                                     TRAP     C$ESCAPE
 (3)  020622  000112                                     .WORD    10000$-.
      020624  032737  020000  002340                     BIT      #NXM,E.CS        ;NON-EXISTANT MEMORY ERROR?
      020632  001002                                     BNE      3$               ;YES, CONTINUE

      020634  004537  014614                             JSR      R5,CHERR                   ;CHECK CNTLR FOR ERRORS
      020640                                   3$:       ESCAPE   SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  020640  104410                                     TRAP     C$ESCAPE
 (3)  020642  000072                                     .WORD    10000$-.

      020644  032737  000020  002340                     BIT      #BA16,E.CS       ;DID BA16 SET?
      020652  001004                                     BNE      4$               ;YES, CONTINUE

      020654                                             ERRDF    10.,EM31,ERRO    ;BA 16 DID NOT INCREMENT
 (4)  020654  104455                                     TRAP     C$ERDF
 (5)  020656  000012                                     .WORD    10
 (5)  020660  006040                                     .WORD    EM31
 (5)  020662  007510                                     .WORD    ERRO

      020664                                   4$:       CKLOOP
 (3)  020664  104406                                     TRAP     C$CLP1
```

```

      020666  032737  000040  002340           BIT     #BA17,E.CS       ;DID BA17 SET ALSO?
      020674  001404                           BEQ     5$               ;NO, GOOD CONTINUE

      020676                                   ERRDF   11.,EM32,ERR0    ;BA 17 GOT CARRIED AWAY
 (4)  020676  104455                           TRAP    C$ERDF
 (5)  020700  000013                           .WORD   11
 (5)  020702  006076                           .WORD   EM32
 (5)  020704  007510                           .WORD   ERR0

      020706                           5$:     CKLOOP
 (3)  020706  104406                           TRAP    C$CLP1

      020710  005037  002300                   CLR     GDDAT            ;CHECK THAT BA15-BA0 IS CLEAR
      020714  013737  002342  002302           MOV     E.BA,BDDAT       ;READ BA
      020722  001404                           BEQ     6$               ;IS BA ZERO?
      020724                                   ERRDF   12.,EM33,ERR4    ;BA SHOULD BE ZERO
 (4)  020724  104455                           TRAP    C$ERDF
 (5)  020726  000014                           .WORD   12
 (5)  020730  006135                           .WORD   EM33
 (5)  020732  007654                           .WORD   ERR4

      020734                           6$:                              ;

      020734                                   ENDSEG                             ;%%END OF SEGMENT%%
 (3)  020734                           10000$:
 (3)  020734  104405                           TRAP    C$ESEG
      020736                           ENDTST                                     ;**END OF TEST**
 (3)  020736                           L10045:
 (3)  020736  104401                           TRAP    C$ETST

                                       .SBTTL  **TEST 12** - BA BIT 17 INCREMENT

      020740                           BGNTST                                     ;**START OF TEST**

      020740                           STARS
 (2)                                   ;;*************************************************************
                                       ;CHECK THAT BA BIT 17 WILL INCREMENT.  WE WILL LOAD THE
                                       ;RLBA WITH 177776 AND BA 16 SET, WE WILLISSUE A ONE WORD
                                       ;WRITE.  WE THEN CHECK BA17 TO SET, BA16 TO CLEAR AND
                                       ;BA15 - BA0 TO CLEAR.
      020740                           STARS
 (2)                                   ;;*************************************************************

      020740  004737  015766                   JSR     PC,HDHOME        ;HEADS OVER TRACK 0
      020744                                   CKERFG                   ;HEADS GO HOME OKAY
 (4)  020752  104432                           TRAP    C$EXIT
 (4)  020754  000162                           .WORD   L10046-.
```

```
                                                                
      020756                                    BGNSEG                                ;%%START OF SEGMENT%%
 (3)  020756  104404                            TRAP    C$BSEG
                                                
      020760                            2$:
      020760  012777  177776  161370            MOV     #177776,@RLBA      ;SET MAX BA TO INC. BA16
      020766  012737  000020  002374            MOV     #BA16,XMEM         ;SET BA16 IN RLCS
      020774  012777  177777  161360            MOV     #-1,@RLMP          ;ONE WORD TRANSFER
      021002  005077  161352                    CLR     @RLDA
      021006  004537  015056                    JSR     R5,LDFUNC                     ;LOAD THE FUNCTION IN NEXT WORD
      021012  000012                            WRITE
      021014  004537  015702                    JSR     R5,WTCRDY          ;WAIT FOR WRITE TO FINISH
      021020                                    ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  021020  104410                            TRAP    C$ESCAPE
 (3)  021022  000112                            .WORD   10000$-.
      021024  032737  020000  002340            BIT     #NXM,E.CS          ;NON-EXISTANT MEMORY ERROR?
      021032  001002                            BNE     3$                 ;YES, CONTINUE

      021034  004537  014614                    JSR     R5,CHERR                      ;CHECK CNTLR FOR ERRORS
      021040                            3$:     ESCAPE  SEG                ;CHFCK FOR FL:LOE, ELSE EXIT SEG
 (3)  021040  104410                            TRAP    C$ESCAPE
 (3)  021042  000072                            .WORD   10000$-.

      021044  032737  000040  002340            BIT     #BA17,E.CS         ;DID BA17 SET?
      021052  001004                            BNE     4$                 ;YES, CONTINUE

      021054                                    ERRDF   13.,EM34,ERR0      ;BA 17 DID NOT SET
 (4)  021054  104455                            TRAP    C$ERDF
 (5)  021056  000015                            .WORD   13
 (5)  021060  006171                            .WORD   EM34
 (5)  021062  007510                            .WORD   ERR0

      021064                            4$:     CKLOOP
 (3)  021064  104406                            TRAP    C$CLP1

      021066  032737  000020  002340            BIT     #BA16,E.CS         ;DID BA16 SET ALSO?
      021074  001404                            BEQ     5$                 ;NO, GOOD CONTINUE

      021076                                    ERRDF   14.,EM35,ERR0      ;BA 16 DIDN'T KNOW WHEN TO QUIT.
 (4)  021076  104455                            TRAP    C$ERDF
 (5)  021100  000016                            .WORD   14
 (5)  021102  006227                            .WORD   EM35
 (5)  021104  007510                            .WORD   ERR0
      021106                            5$:     CKLOOP
 (3)  021106  104406                            TRAP    C$CLP1

      021110  005037  002300                    CLR     GDDAT              ;CHECK THAT BA15-BA0 IS CLEAR
      021114  013737  002342  002302            MOV     E.BA,BDDAT         ;READ BA
      021122  001404                            BEQ     6$                 ;IS BA ZERO?
      021124                                    ERRDF   15.,EM36,ERR4      ;BA SHOULD BE ZERO
 (4)  021124  104455                            TRAP    C$ERDF
 (5)  021126  000017                            .WORD   15
 (5)  021130  006265                            .WORD   EM36
 (5)  021132  007654                            .WORD   ERR4

      021134                            6$:                                ;
 1899
 1900  021134                                    ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  021134                            10000$:
  (3)  021134  104405                            TRAP    C$ESEG
 1901  021136                            ENDTST                                          ;**END OF TEST**
  (3)  021136                            L10046:
  (3)  021136  104401                            TRAP    C$ETST
 1902
 1903
 1904                                    .SBTTL  **TEST 13** - READ FUNCTION
 1905
 1906  021140                            BGNTST                                          ;**START OF TEST**
 1907
 1908  021140                            STARS
  (2)                                    ;;*******************************************************************
 1909                                    ;CHECK OF THE READ FUNCTION.  WE WILL FIRST DO A READ
 1910                                    ;HEADER TO FIND OUT WHERE WE ARE AND THEN ISSUE
 1911                                    ;A FULL SECTOR READ, WAIT FOR READY AND CHECK FOR
 1912                                    ;ANY ERRORS
 1913  021140                            STARS
  (2)                                    ;;*******************************************************************
 1914
 1915
 1916  021140  004737  015766                    JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 1917  021144                                    CKERFG                  ;HEADS GO HOME OKAY
  (4)  021152  104432                            TRAP    C$EXIT
  (4)  021154  000064                            .WORD   L10047-.
 1918
 1919  021156                                    BGNSEG                                  ;%%START OF SEGMENT%%
  (3)  021156  104404                            TRAP    C$BSEG
 1920
 1921  021160  012737  001750  002272            MOV     #1000.,TMPO
 1922  021166  005077  161166            1$:     CLR     @RLDA           ;LOAD DISK ADDRESS
 1923  021172  012777  177600  161162            MOV     #-128.,@RLMP    ;SET WORD LENGTH
 1924  021200  012777  003426  161150            MOV     #BUF,@RLBA      ;SET BUS ADDRESS
 1925
 1926  021206  004537  015056                    JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
 1927  021212  000014                            READ                    ;READ
 1928  021214  004537  015702                    JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
 1929  021220                                    ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  021220  104410                            TRAP    C$ESCAPE
  (3)  021222  000014                            .WORD   10000$-.
 1930
 1931  021224  004537  014614                    JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
 1932
 1933  021230  005337  002272                    DEC     TMPO
 1934  021234  001354                            BNE     1$
 1935  021236                                    ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  021236                            10000$:
  (3)  021236  104405                            TRAP    C$ESEG
 1936  021240                            ENDTST                                          ;**END OF TEST**
  (3)  021240                            L10047:
  (3)  021240  104401                            TRAP    C$ETST
 1937
 1938                                    .SBTTL  **TEST 14** - READ FUNCTION INTERRUPT
 1939
 1940  021242                                   BGNTST                                          ;**START OF TEST**
 1941
 1942  021242                                   STARS
  (2)                                           ;;*******************************************************************
 1943                                           ;CHECK OF THE READ FUNCTION UNDER INTERRUPT CONTROL, WE WILL
 1944                                           ;ISSUE A READ HEADER TO GET POSITION AND THEN READ
 1945                                           ;A FULL SECTOR WAITING FOR THE INTERRUPT.  CHECK FOR
 1946                                           ;ERRORS ON INTERRUPT.
 1947  021242                                   STARS
  (2)                                           ;;*******************************************************************
 1948
 1949
 1950  021242  004737  015766                           JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 1951  021246                                           CKERFG                  ;HEADS GO HOME OKAY
  (4)  021254  104432                                   TRAP    C$EXIT
  (4)  021256  000106                                   .WORD   L10050-.
 1952
 1953  021260                                           BGNSEG                          ;%%START OF SEGMENT%%
  (3)  021260  104404                                   TRAP    C$BSEG
 1954
 1955  021262  005037  002256                           CLR     INTFLG          ;CLEAR INTERRUPT INDICATOR
 1956  021266  005077  161066                           CLR     @RLDA           ;SET DISK ADDRESS
 1957  021272  012777  177600  161062                   MOV     #-128.,@RLMP    ;SET UP WORD COUNT
 1958  021300  012777  003426  161050                   MOV     #BUF,@RLBA      ;SET UP BUS ADDRESS
 1959
 1960  021306                                           SETPRI  #PRI00          ;PRIORITY TO 0
  (3)  021306  012700  000000                           MOV     #PRI00,R0
  (3)  021312  104441                                   TRAP    C$SPRI
 1961  021314  004537  015056                           JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
 1962  021320  000114                                   READ!INTEN              ;READ UNDER INTERRUPT
 1963  021322  004537  015702                           JSR     R5,WTCRDY       ;WAIT FOR INTERRUPT
 1964  021326                                           CKLOOP
  (3)  021326  104406                                   TRAP    C$CLP1
 1965  021330                                           SETPRI  #PRI07          ;PRIORITY TO 7
  (3)  021330  012700  000340                           MOV     #PRI07,R0
  (3)  021334  104441                                   TRAP    C$SPRI
 1966
 1967  021336  005737  002256                           TST     INTFLG          ;DID INTERRUPT OCCUR?
 1968  021342  001004                                   BNE     1$              ;YES-BRANCH NO-REPORT
 1969
 1970  021344                                           ERRDF   19.,EM4,ERR0    ;READ DID NOT INTERRUPT
  (4)  021344  104455                                   TRAP    C$ERDF
  (5)  021346  000023                                   .WORD   19
  (5)  021350  004712                                   .WORD   EM4
  (5)  021352  007510                                   .WORD   ERR0
 1971  021354                                   1$:     CKLOOP                  ;CHECK FOR LOOP
  (3)  021354  104406                                   TRAP    C$CLP1
 1972
 1973  021356  004537  014614                           JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
 1974
 1975  021362                                           ENDSEG                          ;%%END OF SEGMENT%%
  (3)  021362                                   10000$:
  (3)  021362  104405                                   TRAP    C$ESEG
 1976  021364                                   ENDTST                                  ;**END OF TEST**
  (3)  021364                                   L10050:
  (3)  021364  104401                                   TRAP    C$ETST
```

```

                                        .SBTTL  **TEST 15** - CHECK READ NPR DIRECTION

     021366                             BGNTST                                        ;**START OF TEST**

     021366                             STARS
(2)                                     ;;*************************************************************
                                        ;CHECK THAT THE READ FUNCTION ACTUALLY READS (INTO MEMORY)
                                        ;WE WILL WRITE A PATTERN INTO MEMORY AND THEN ISSUE
                                        ;A READ TO OVERLAY THAT PATTERN.  AFTER THE READ
                                        ;WE CHECK TO SEE IF THE WRITTEN PATTERN HAS CHANGED.
                                        ;IF NOT WE ISSUE IT AGAIN AT THE SAME SECTION AFTER
                                        ;HAVING MODIFIED OUR PATTERN IN MEMORY (SINCE THERE IS
                                        ;ONE CHANCE THAT THE DISK COULD HAVE OUR PATTERN).  AFTER
                                        ;THE SECOND READ WE CHECK THE BUFFER AGAIN.  IF IT'S
                                        ;NO CHANGED WE REPORT AN ERROR
     021366                             STARS
(2)                                     ;;*************************************************************


     021366  004737  015766                     JSR     PC,HDHOME       ;HEADS OVER TRACK 0
     021372                                     CKERFG                  ;HEADS GO HOME OKAY
(4)  021400  104432                             TRAP    C$EXIT
(4)  021402  000156                             .WORD   L10051-.

     021404                                     BGNSEG                                ;%%START OF SEGMENT%%
(3)  021404  104404                             TRAP    C$BSEG

     021406  012737  123456  002272             MOV     #123456,TMP0    ;SET PATTERN TO WRITE
     021414  005037  002274                     CLR     TMP1            ;CLEAR PASS INDICATOR
     021420  012700  003426         1$:         MOV     #BUF,R0         ;SET UP BUFFER BEGINNING
     021424  012701  000200                     MOV     #128.,R1
     021430  013720  002272         2$:         MOV     TMP0,(R0)+      ;WRITE BUFFER
     021434  005301                             DEC     R1              ;DONE??
     021436  001374                             BNE     2$              ;NO, GO BACK
     021440  005077  160714                     CLR     @RLDA           ;LOAD DISK ADDRESS
     021444  012777  177600  160710             MOV     #-128.,@RLMP    ;SET WORD COUNT
     021452  012777  003426  160676             MOV     #BUF,@RLBA      ;LOAD BUS ADDRESS
     021460  012737  003426  002300             MOV     #BUF,GDDAT      ;FOR ERROR PRINT

     021466  004537  015056                     JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
     021472  000014                             READ                    ;READ
     021474  004537  015702                     JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
     021500                                     ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3)  021500  104410                             TRAP    C$ESCAPE
(3)  021502  000054                             .WORD   10000$-.

     021504  004537  014614                     JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
     021510                                     ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3)  021510  104410                             TRAP    C$ESCAPE
(3)  021512  000044                             .WORD   10000$-.

     021514  012702  003426                     MOV     #BUF,R2         ;SET TO START COMPARING DATA
     021520  022237  002272         4$:         CMP     (R2)+,TMP0      ;DID DATA CHANGE?
     021524  001014                             BNE     6$              ;YES, CHECK FOR END
                                                                        ;
```

```
  2024
  2025                                                                  ;DATA DIDN'T CHANGE, CHECK
  2026  021526  005737  002274                  TST     TMP1            ;IF 1ST OR 2ND TIME?
  2027  021532  001005                          BNE     5$              ;2ND-REPORT 1ST-TRY AGAIN
  2028
  2029  021534  005237  002274                  INC     TMP1            ;INC PASS COUNT
  2030  021540  005137  002272                  COM     TMPO            ;COMPLIMENT PATTERN
  2031  021544  000725                          BR      1$              ;GO DO IT AGAIN
  2032
  2033  021546                          5$:     ERRDF   20.,EM5,ERR9    ;READ DID NOT MODIFY MEMORY
   (4)  021546  104455                          TRAP    C$ERDF
   (5)  021550  000024                          .WORD   20
   (5)  021552  004735                          .WORD   EM5
   (5)  021554  010102                          .WORD   ERR9
  2034
  2035  021556                          6$:
  2036
  2037  021556                                  ENDSEG                                  ;%%END OF SEGMENT%%
   (3)  021556                          10000$:
   (3)  021556  104405                          TRAP    C$ESEG
  2038  021560                          ENDTST                                          ;**END OF TEST**
   (3)  021560                          L10051:
   (3)  021560  104401                          TRAP    C$ETST
  2039
  2040                                  .SBTTL  **TEST 16** - PROPER INCREMENT OF RLBA ON READ
  2041
  2042  021562                          BGNTST                                          ;**START OF TEST**
  2043
  2044  021562                          STARS
   (2)                                  ;;*****************************************************************
  2045                                  ;CHECK THAT THE RLBA WILL INCREMENT WITH THE READ
  2046                                  ;THE RLBA SHOULD CONTAIN 'BUF +256.''  AFTER A FULL SECTOR
  2047                                  ;READ.
  2048  021562                          STARS
   (2)                                  ;;*****************************************************************
  2049
  2050
  2051  021562  004737  015766                  JSR     PC,HDHOME       ;HEADS OVER TRACK 0
  2052  021566                                  CKERFG                  ;HEADS GO HOME OKAY
   (4)  021574  104432                          TRAP    C$EXIT
   (4)  021576  000116                          .WORD   L10052-.
  2053
  2054  021600                                  BGNSEG                                  ;%%START OF SEGMENT%%
   (3)  021600  104404                          TRAP    C$BSEG
  2055
  2056  021602  005077  160552                  CLR     @RLDA           ;SET UP DISK ADDRESS
  2057  021606  012777  003426  160542          MOV     #BUF,@RLBA      ;SET UP BUS ADDRESS
  2058  021614  012777  177600  160540          MOV     #-128.,@RLMP    ;WORD COUNT
  2059  021622  012737  003426  002300          MOV     #BUF,GDDAT      ;FORM EXPECTED BUS ADDRESS
  2060  021630  062737  000400  002300          ADD     #256.,GDDAT     ;AFTER READ
  2061
  2062  021636  004537  015056                  JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
  2063  021642  000014                          READ                    ;READ
  2064  021644  004537  015702                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
  2065  021650                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  021650  104410                          TRAP    C$ESCAPE
  (3)  021652  000040                           .WORD   10000$-.
 2066
 2067  021654  004537  014614                   JSR     R5,CHERR                   ;CHECK CNTLR FOR ERRORS
 2068  021660                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  021660  104410                           TRAP    C$ESCAPE
  (3)  021662  000030                           .WORD   10000$-.
 2069  021664  013737  002342  002302           MOV     E.BA,BDDAT      ;READ 'RLBA' FOR PRESENT ADDRESS
 2070  021672  023737  002302  002300           CMP     BDDAT,GDDAT     ;DID 'BA' INCREMENT PROPERLY?
 2071  021700  001404                           BEQ     1$              ;YES, CONTINUE
 2072
 2073  021702                                   ERRDF   21.,EM6,ERR4    ;BA DID NOT INCREMENT PROPERLY
  (4)  021702  104455                           TRAP    C$ERDF
  (5)  021704  000025                           .WORD   21
  (5)  021706  004763                           .WORD   EM6
  (5)  021710  007654                           .WORD   ERR4
 2074
 2075  021712                           1$:
 2076
 2077  021712                                   ENDSEG                             ;%%END OF SEGMENT%%
  (3)  021712                           10000$:
  (3)  021712  104405                           TRAP    C$ESEG
 2078  021714                           ENDTST                                     ;**END OF TEST**
  (3)  021714                           L10052:
  (3)  021714  104401                           TRAP    C$ETST
 2079
 2080                                   .SBTTL  **TEST 17** - PROPER INCREMENT OF RLDA ON READ
 2081
 2082  021716                           BGNTST                                     ;**START OF TEST**
 2083
 2084  021716                           STARS
  (2)                                   ;;*******************************************************************
 2085                                   ;CHECK THAT THE RLDA INCREMENTS BY ONE AFTER A
 2086                                   ;FULL SECTOR READ. WE FIRST READ A HEADER TO FIND
 2087                                   ;OUT WHERE WE ARE, THEN ISSUE A READ AFTER
 2088                                   ;THE READ THE RLDA SHOULD BE RLDA (START) + 1
 2089  021716                           STARS
  (2)                                   ;;*******************************************************************
 2090
 2091  021716  004737  015766                   JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 2092  021722                                   CKERFG                  ;HEADS GO HOME OKAY
  (4)  021730  104432                           TRAP    C$EXIT
  (4)  021732  000114                           .WORD   L10053-.
 2093
 2094  021734                                   BGNSEG                             ;%%START OF SEGMENT%%
  (3)  021734  104404                           TRAP    C$BSEG
 2095
 2096
 2097  021736  005037  002300                   CLR     GDDAT
 2098  021742  013777  002300  160410           MOV     GDDAT,@RLDA     ;SETUP DISK ADDRESS
 2099  021750  005237  002300                   INC     GDDAT           ;CREATE EXPECTED SECTOR
 2100  021754  012777  177600  160400           MOV     #-128.,@RLMP    ;WORD COUNT
 2101  021762  012777  003426  160366           MOV     #BUF,@RLBA      ;SETUP BUS ADDRESS
 2102
 2103  021770  004537  015056                   JSR     R5,LDFUNC                  ;LOAD THE FUNCTION IN NEXT WORD
 2104  021774  000014                           READ                    ;READ
 2105  021776  004537  015702                   JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
```

```
      022002                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022002  104410                          TRAP    C$ESCAPE
 (3)  022004  000040                          .WORD   10000$-.

      022006  004537  014614                  JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
      022012                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022012  104410                          TRAP    C$ESCAPE
 (3)  022014  000030                          .WORD   10000$-.

      022016  013737  002344  002302          MOV     E.DA,BDDAT      ;READ DISK ADDRESS
      022024  023737  002300  002302          CMP     GDDAT,BDDAT     ;DID SECTOR INCREMENT PROPERLY
      022032  001404                          BEQ     1$              ;YES, BRANCH  NO, REPORT ERROR

      022034                                  ERRDF   22.,EM7,ERR4    ;DISK ADDRESS DID NOT INCREMENT
 (4)  022034  104455                          TRAP    C$ERDF
 (5)  022036  000026                          .WORD   22
 (5)  022040  005017                          .WORD   EM7
 (5)  022042  007654                          .WORD   ERR4

      022044                          1$:

      022044                                  ENDSEG                          ;%%END OF SEGMENT%%
 (3)  022044                          10000$:
 (3)  022044  104405                          TRAP    C$ESEG
      022046                          ENDTST                                  ;**END OF TEST**
 (3)  022046                          L10053:
 (3)  022046  104401                          TRAP    C$ETST

                                      .SBTTL  **TEST 18** - FORCE HEADER NOT FOUND WITH READ

      022050                          BGNTST                                  ;**START OF TEST**

      022050                          STARS
 (2)                                  ;;*********************************************************************
                                      ;FORCE HEADER NOT FOUND ERROR TO OCCUR.  THIS IS DONE
                                      ;BY SETTING SECTOR 40 OF THE RLDA AND ISSUING A
                                      ;READ.  SECTOR 40 DOES NOT EXIST ON THE RL01 PACK
                                      ;THEREFORE HDR NT FOUND SHOULD SET.
      022050                          STARS
 (2)                                  ;;*********************************************************************

      022050  004737  015766                  JSR     PC,HDHOME       ;HEADS OVER TRACK 0
      022054                                  CKERFG                  ;HEADS GO HOME OKAY
 (4)  022062  104432                          TRAP    C$EXIT
 (4)  022064  000102                          .WORD   L10054-.

      022066                                  BGNSEG                          ;%%START OF SEGMENT%%
 (3)  022066  104404                          TRAP    C$BSEG


      022070  012777  000050  160262          MOV     #40.,@RLDA      ;INSURE NOT TO FIND HEADER BY
      022076  012777  003426  160252          MOV     #BUF,@RLBA      ;SETTING SECTOR 40 OF CYL. ADDR.
      022104  012777  177777  160250          MOV     #-1,@RLMP       ;WORD COUNT

      022112  004537  015056                  JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
      022116  000014                          READ                    ;READ
      022120  004537  015702                     JSR     R5,WTCRDY        ;WAIT FOR CONTROLLER READY
      022124                                     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022124  104410                             TRAP    C$ESCAPE
 (3)  022126  000036                             .WORD   10000$-.

      022130  013737  002340  002272             MOV     E.CS,TMPO        ;GET RLCS
      022136  042737  001777  002272             BIC     #1777,TMPO       ;SAVE ERROR BITS
      022144  022737  112000  002272             CMP     #BIT15!BIT12!BIT10,TMPO  ;HDR NOT FOUND SET.
      022152  001404                             BEQ     1$               ;YES, CONTINUE

      022154                                     ERRDF   23.,EM10,ERRO    ;HEADER NOT FOUND WOULD NOT SET
 (4)  022154  104455                             TRAP    C$ERDF
 (5)  022156  000027                             .WORD   23
 (5)  022160  005064                             .WORD   EM10
 (5)  022162  007510                             .WORD   ERRO

      022164                             1$:
                                         ;

      022164                                     ENDSEG                             ;%%END OF SEGMENT%%
 (3)  022164                             10000$:
 (3)  022164  104405                             TRAP    C$ESEG
      022166                             ENDTST                                     ;**END OF TEST**
 (3)  022166                             L10054:
 (3)  022166  104401                      .      TRAP    C$ETST

                                         .SBTTL  **TEST 19** - FORCE HEADER NOT FOUND WITH READ INTERRUPT

      022170                             BGNTST                                     ;**START OF TEST**


      022170                             STARS
 (2)                                     ;;****************************************************************
                                         ;TEST THAT HEADER NOT FOUND ERROR WILL GENERATE AN INTERRUPT
                                         ;ON OCCURANCE.  HEADER NOT FOUND WILL BE FORCED BY SETTING
                                         ;SECTOR 40 OF RLDA AND ISSUING A READ
      022170                             STARS
 (2)                                     ;;****************************************************************


      022170  004737  015766                     JSR     PC,HDHOME        ;HEADS OVER TRACK 0
      022174                                     CKERFG                   ;HEADS GO HOME OKAY
 (4)  022202  104432                             TRAP    C$EXIT
 (4)  022204  000142                             .WORD   L10055-.

      022206                                     BGNSEG                             ;%%START OF SEGMENT%%
 (3)  022206  104404                             TRAP    C$BSEG

      022210                                     SETPRI  #PRI00
 (3)  022210  012700  000000                     MOV     #PRI00,R0
 (3)  022214  104441                             TRAP    C$SPRI
      022216  005037  002256                     CLR     INTFLG           ;CLEAR INTERRUPT OCCURANCE FLAG
      022222  012777  000050  160130             MOV     #40.,@RLDA       ;INSURE NOT TO FIND HEADER BY
      022230  012777  003426  160120             MOV     #BUF,@RLBA       ;SETTING SECTOR 40 OF CYL. ADDR.
      022236  012777  177777  160116             MOV     #-1,@RLMP        ;WORD COUNT
 2184  022244  004537  015056                 JSR     R5,LDFUNC                    ;LOAD THE FUNCTION IN NEXT WORD
 2185  022250  000114                         READ!INTEN                ;READ
 2186  022252  004537  015702                 JSR     R5,WTCRDY         ;WAIT FOR CONTROLLER READY
 2187  022256                                 CKLOOP
  (3)  022256  104406                         TRAP    C$CLP1
 2188  022260                                 SETPRI  #PRI07
  (3)  022260  012700  000340                 MOV     #PRI07,R0
  (3)  022264  104441                         TRAP    C$SPRI
 2189
 2190  022266  005737  002256                 TST     INTFLG            ;DID INTERRUPT OCCUR
 2191  022272  001004                         BNE     2$                ;YES
 2192
 2193  022274                                 ERRDF   24.,EM43,ERRO     ;HNF DID NOT INTERRUPT
  (4)  022274  104455                         TRAP    C$ERDF
  (5)  022276  000030                         .WORD   24
  (5)  022300  006461                         .WORD   EM43
  (5)  022302  007510                         .WORD   ERRO
 2194
 2195  022304                         2$:     ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  022304  104410                         TRAP    C$ESCAPE
  (3)  022306  000036                         .WORD   10000$-.
 2196
 2197
 2198  022310  013737  002340  002272         MOV     E.CS,TMPO         ;GET RLCS
 2199  022316  042737  001777  002272         BIC     #1777,TMPO        ;SAVE ERROR BITS
 2200  022324  022737  112000  002272         CMP     #BIT15!BIT12!BIT10,TMPO  ;WDR NOT FOUND SET.
 2201  022332  001404                         BEQ     1$                ;YES, CONTINUE
 2202
 2203  022334                                 ERRDF   25.,EM10,ERRO
  (4)  022334  104455                         TRAP    C$ERDF
  (5)  022336  000031                         .WORD   25
  (5)  022340  005064                         .WORD   EM10
  (5)  022342  007510                         .WORD   ERRO
 2204                                                                   ;WHEN FORCED
 2205  022344                         1$:
 2206
 2207  022344                                 ENDSEG                             ;%%END OF SEGMENT%%
  (3)  022344                         10000$:
  (3)  022344  104405                         TRAP    C$ESEG
 2208  022346                         ENDTST                                     ;**END OF TEST**
  (3)  022346                         L10055:
  (3)  022346  104401                         TRAP    C$ETST
 2209
 2210                                 .SBTTL  **TEST 20** - CHECK HEADER COMPARE LOGIC
 2211
 2212  022350                         BGNTST                                     ;**START OF TEST**
 2213
 2214  022350                         STARS
  (2)                                 ;;*********************************************************************
 2215                                 ;CHECK THE HEADER COMPARE LOGIC WORKS.  UP TO THIS POINT WE
 2216                                 ;KNOW THAT THE LOGIC FUNCTIONS PROPERLY BUT NOW WE WILL
 2217                                 ;CHECK ALL THE BITS IN THE HEADER WORD.  FOUR PATTERNS
 2218                                 ;ARE USED A WALKING 1, GROWING 1, WALKING 0, GROWING 0.  A SEEK
 2219                                 ;IS ISSUED BEFORE EACH READ TO INSURE WE ARE ON THE PROPER
 2220                                 ;TRACK.  ONCE WE ARE ON THE RIGHT TRACKWE LOAD THE RLDA
 2221                                 ;AND ISSUE THE READ.  UPON COMPLETION WE WILL CHECK FOR ERRORS
```

```
                                        ;WE THEN LOAD THE COMPLEMENT PATTERN INTO THE RLDA
                                        ;EXPECTING A HEADER NOT FOUND TO SET
    022350                              STARS
(2)                                     ;;*************************************************************


    022350  004737  015766                      JSR     PC,HDHOME       ;HEADS OVER TRACK 0
    022354                                      CKERFG                  ;HEADS GO HOME OKAY
(4) 022362  104432                              TRAP    C$EXIT
(4) 022364  000574                              .WORD   L10056-.

    022366                                      BGNSEG                          ;%%START OF SEGMENT%%
(3) 022366  104404                              TRAP    C$BSEG

    022370                                      SETPRI  #PRI07          ;PRIORITY TO 7
(3) 022370  012700  000340                      MOV     #PRI07,R0
(3) 022374  104441                              TRAP    C$SPRI
    022376  022737  000001  002232              CMP     #1,T.DRIVE      ;CHECK TYPE OF DRIVE (RL01 OR RL02)
    022404  001003                              BNE     22$             ;RL02? THEN BRANCH
    022406  012703  002670                      MOV     #HDRTAB,R3      ;MOV ADDRESS OF BEG PATTERN TO R3
    022412  000402                              BR      33$             ; THEN BRANCH
    022414  012703  003050              22$:    MOV     #HTAB,R3        ;MOV ADDRESS OF BEG PATTERN TO R3
    022420                              33$:    BGNSEG                          ;START OF SEGMENT
(3) 022420  104404                              TRAP    C$BSEG
    022422                              1$:
    022422  004537  015056                      JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
    022426  000010                              RDHDR                   ;READ HEADER
    022430  004537  015702                      JSR     R5,WTCRDY       ;WAIT FOR CONTROLLRE READY
    022434                                      ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3) 022434  104410                              TRAP    C$ESCAPE
(3) 022436  000516                              .WORD   10001$-.

    022440  004537  014614                      JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
    022444                                      ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3) 022444  104410                              TRAP    C$ESCAPE
(3) 022446  000506                              .WORD   10001$-.
    022450  013737  002346  002274              MOV     E.MP,TMP1       ;READ AND SAVE HEADER

    022456  042737  000177  002274              BIC     #177,TMP1       ;CLEAR OUT SECTOR AND H.S.
    022464  012777  000001  157666              MOV     #1,@RLDA        ;SETUP MARKER FOR SEEK
    022472  011337  002276                      MOV     (R3),TMP2       ;GET HEADER PATTERN
    022476  042737  000177  002276              BIC     #177,TMP2       ;CLEAR OUT SECTOR AND H.S.
    022504  163737  002274  002276              SUB     TMP1,TMP2       ;CALCULATE DIFFERENCE TO SEEK
    022512  103404                              BCS     2$              ;BRANCH FOR SEEK OUT
    022514  052777  000004  157636              BIS     #SIGN,@RLDA     ;SEEK TOWARDS SPINDLE
    022522  000402                              BR      3$              ;GO PUT IN DIFFERENCE WORD
    022524  005437  002276              2$:     NEG     TMP2            ;WE HAVE TO NEGATE DIFFERENCE
    022530  053777  002276  157622      3$:     BIS     TMP2,@RLDA      ;SET IN DIFFERENCE WORD
    022536  032713  000100                      BIT     #RHHS,(R3)      ;DO WE WANT HEAD SELECT AS 0?
    022542  001403                              BEQ     4$              ;YES, SKIP OVER SETTING H.S.
    022544  052777  000020  157606              BIS     #DAHS,@RLDA     ;SET HEAD SELECT TO ONE
    022552  004537  015056              4$:     JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
    022556  000006                              SEEK                    ;SEEK


    022560  004537  015702                      JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
```

```
2267  022564                              ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022564  104410                      TRAP    C$ESCAPE
 (3)  022566  000366                      .WORD   10001$-.
2268
2269  022570  004537  014614              JSR     R5,CHERR                 ;CHECK CNTLR FOR ERRORS
2270  022574                              ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022574  104410                      TRAP    C$ESCAPE
 (3)  022576  000356                      .WORD   10001$-.
2271
2272  022600  004537  015636              JSR     R5,WTDRDY        ;WAIT FOR DRIVE READY
2273  022604                              ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022604  104410                      TRAP    C$ESCAPE
 (3)  022606  000346                      .WORD   10001$-.
2274  022610  004537  015056              JSR     R5,LDFUNC                ;LOAD THE FUNCTION IN NEXT WORD
2275  022614  000010                      RDHDR                    ;READ HEADER (VERIFY SEEK)
2276  022616  004537  015702              JSR     R5,WTCRDY        ;WAIT FOR CONTROLLER READY
2277  022622                              ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022622  104410                      TRAP    C$ESCAPE
 (3)  022624  000330                      .WORD   10001$-.
2278
2279  022626  004537  014614              JSR     R5,CHERR                 ;CHECK CNTLR FOR ERRORS
2280  022632                              ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022632  104410                      TRAP    C$ESCAPE
 (3)  022634  000320                      .WORD   10001$-.
2281
2282  022636  013737  002346  002302      MOV     E.MP,BDDAT       ;READ HEADER
2283  022644  043737  002262  002302      BIC     SECMSK,BDDAT     ;SAVE CYLINDER FOR COMPARE
2284  022652  011337  002300              MOV     (R3),GDDAT       ;GET EXPECTED HEADER
2285  022656  043737  002262  002300      BIC     SECMSK,GDDAT     ;SAVE CYLINDER FOR COMPARE
2286  022664  023737  002300  002302      CMP     GDDAT,BDDAT      ;SEEK END UP OKAY
2287  022672  001404                      BEQ     5$               ;YES, CONTINUE
2288
2289  022674                              ERRDF   27.,EM11,ERR4    ;SEEK INCORRECT
 (4)  022674  104455                      TRAP    C$ERDF
 (5)  022676  000033                      .WORD   27
 (5)  022700  005124                      .WORD   EM11
 (5)  022702  007654                      .WORD   ERR4
2290
2291  022704                      5$:     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022704  104410                      TRAP    C$ESCAPE
 (3)  022706  000246                      .WORD   10001$-.
2292
2293  022710  011377  157444              MOV     (R3),@RLDA       ;SET UP DISK ADDRESS
2294  022714  042777  000077  157436      BIC     #77,@RLDA
2295  022722  012777  177777  157432      MOV     #-1,@RLMP        ;WORD COUNT
2296  022730  012777  003426  157420      MOV     #BUF,@RLBA       ;BUS ADDRESS
2297
2298  022736  004537  015056              JSR     R5,LDFUNC                ;LOAD THE FUNCTION IN NEXT WORD
2299  022742  000014                      READ                     ;READ
2300  022744  004537  015702              JSR     R5,WTCRDY        ;WAIT FOR CONTROLLER READY
2301  022750                              ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  022750  104410                      TRAP    C$ESCAPE
 (3)  022752  000202                      .WORD   10001$-.
2302
2303  022754  004537  014614              JSR     R5,CHERR                 ;CHECK CNTLR FOR ERRORS
2304  022760                              ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
```

```
 (3)  022760  104410                         TRAP    C$ESCAPE
 (3)  022762  000172                         .WORD   10001$-.

      022764  011377  157370                 MOV     (R3),@RLDA          ;SET UP DISK ADDRESS AS
      022770  005177  157364                 COM     @RLDA               ;COMPLIMENT TO CAUSE HDR NT FND
      022774  012777  177777  157360         MOV     #-1,@RLMP           ;WORD COUNT
      023002  012777  003426  157346         MOV     #BUF,@RLBA          ;BUS ADDRESS

      023010  004537  015056                 JSR     R5,LDFUNC                    ;LOAD THE FUNCTION IN NEXT WORD
      023014  000014                         READ                        ;READ
      023016  004537  015702                 JSR     R5,WTCRDY           ;WAIT FOR CONTROLLER READY
      023022                                 ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  023022  104410                         TRAP    C$ESCAPE
 (3)  023024  000130                         .WORD   10001$-.
      023026  013737  002340  002272         MOV     E.CS,TMPO           ;GET CS
      023034  042737  001777  002272         BIC     #1777,TMPO          ;SAVE ERROR BITS
      023042  022737  112000  002272         CMP     #BIT15!BIT12!BIT10,TMPO  ;DID HEADER NOT FOUND SET
      023050  001402                         BEQ     8$                  ;YES, CONTINUE
      023052  004537  014614                 JSR     R5,CHERR
      023056                         8$:     CKLOOP
 (3)  023056  104406                         TRAP    C$CLP1

      023060  022737  112000  002272         CMP     #BIT15!BIT12!BIT10,TMPO
      023066  001413                         BEQ     6$

      023070  011337  002300                 MOV     (R3),GDDAT          ;SET UP DATA FOR ERROR
      023074  013737  002300  002302         MOV     GDDAT,BDDAT         ;PRINT OUT
      023102  005137  002302                 COM     BDDAT

      023106                                 ERRDF   28.,EM12,ERR4       ;HDR NOT FOUND WOULD NOT SET
 (4)  023106  104455                         TRAP    C$ERDF
 (5)  023110  000034                         .WORD   28
 (5)  023112  005144                         .WORD   EM12
 (5)  023114  007654                         .WORD   ERR4

      023116                         6$:     ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  023116  104410                         TRAP    C$ESCAPE
 (3)  023120  000034                         .WORD   10001$-.

      023122  005723                         TST     (R3)+               ;GET NEXT PATTERN
      023124  022737  000001  002232         CMP     #1,T.DRIVE          ;TYPE OF DRIVE RL01 OR RL02
      023132  001003                         BNE     60$                 ;RL02 ? THEN BRANCH
      023134  020327  003046                 CMP     R3,#HDREND          ;CMP IT WITH #HDREND
      023140  000402                         BR      77$                 ;THEN BRANCH
      023142  020327  003234         60$:    CMP     R3,#HEND            ;CMP IT WITH #HEND
      023146  001402                 77$:    BEQ     7$                  ;YES,EXIT TEST
      023150  000137  022422                 JMP     1$                  ;NO, GO BACK

      023154                         7$:
      023154                                 ENDSEG                               ;%%END OF SEGMENT%%
 (3)  023154                         10001$:
 (3)  023154  104405                         TRAP    C$ESEG

      023156                                 ENDSEG                               ;%%END OF SEGMENT%%
 (3)  023156                         10000$:
 (3)  023156  104405                         TRAP    C$ESEG
```

```
     023160                                ENDTST                                      ;**END OF TEST**
(3)  023160                                L10056:
(3)  023160  104401                                TRAP    C$ETST

                                           .SBTTL  **TEST 21** - CHECK MULTIPLE SECTORS ON READ

     023162                                BGNTST                                      ;**START OF TEST**

     023162                                STARS
(2)                                        ;;****************************************************************
                                           ;VERIFY THAT MULTIPLE SECTORS CAN BE READ, WE WILL CHECK
                                           ;THAT THE RLDA INCREMENTS PROPERLY.
     023162                                STARS
(2)                                        ;;****************************************************************


     023162  004737  015766                        JSR     PC,HDHOME       ;HEADS OVER TRACK 0
     023166                                        CKERFG                  ;HEADS GO HOME OKAY
(4)  023174  104432                                TRAP    C$EXIT
(4)  023176  000156                                .WORD   L10057-.


     023200  005037  002272                        CLR     TMP0            ;CLEAR LOCATIONS
     023204  005037  002274                        CLR     TMP1

     023210                                        BGNSEG                          ;%%START OF SEGMENT%%
(3)  023210  104404                                TRAP    C$BSEG

     023212                                1$:
     023212  013737  002274  002300                MOV     TMP1,GDDAT      ;GET CYLINDER
     023220  053737  002272  002300                BIS     TMP0,GDDAT      ;GET SECTOR
     023226  013777  002300  157124                MOV     GDDAT,@RLDA     ;SET DISK ADDRESS-SECTOR 0
     023234  062737  000002  002300                ADD     #2,GDDAT        ;SET EXPECTED + 2
     023242  012777  003426  157106                MOV     #BUF,@RLBA      ;SET BUS ADDRESS
     023250  012777  177577  157104                MOV     #-129.,@RLMP    ;WORD COUNT-SECTOR+1 WORD

     023256  004537  015056                        JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
     023262  000014                                READ                    ;READ
     023264  004537  015702                        JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY?
     023270                                        ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3)  023270  104410                                TRAP    C$ESCAPE
(3)  023272  000060                                .WORD   10000$-.

     023274  004537  014614                        JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
     023300                                        ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3)  023300  104410                                TRAP    C$ESCAPE
(3)  023302  000050                                .WORD   10000$-.

     023304  013737  002344  002302                MOV     E.DA,BDDAT      ;READ DISK ADDRESS
     023312  023737  002302  002300                CMP     BDDAT,GDDAT     ;IS DISK ADDRESS CORRECT
     023320  001404                                BEQ     2$              ;YES, BRANCH  NO, REPORT ERROR

     023322                                        ERRDF   29.,EM14,ERR4   ;DA DID NOT INCREMENT
(4)  023322  104455                                TRAP    C$ERDF
(5)  023324  000035                                .WORD   29
(5)  023326  005224                                .WORD   EM14
```

```
  (5)  023330  007654                           .WORD   ERR4
 2388
 2389  023332                           2$:     ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  023332  104410                           TRAP    C$ESCAPE
  (3)  023334  000016                           .WORD   10000$-.
 2390
 2391  023336  005237  002272                   INC     TMPO            ;NEXT SECTOR?
 2392  023342  022737  000046  002272           CMP     #46,TMPO        ;DONE?
 2393  023350  001320                           BNE     1$              ;NO, GO BACK
 2394
 2395
 2396  023352                                   ENDSEG                          ;%%END OF SEGMENT%%
  (3)  023352                           10000$:
  (3)  023352  104405                           TRAP    C$ESEG
 2397  023354                           ENDTST                                  ;**END OF TEST**
  (3)  023354                           L10057:
  (3)  023354  104401                           TRAP    C$ETST
 2398  023356                           STARS
  (2)                                   ;;*************************************************************
 2399                                   ;CHECK THAT WE CAN FORCE A HEADER NOT FOUND AT THE
 2400                                   ;END OF A TRACK DOING A MULTIPLE SECTOR READ.  WE
 2401                                   ;SET UP TO READ TWO SECTORS STARTING AT SECTOR 39
 2402                                   ;WE SHOULD TRANSFER 128 WORDS THEN ABORT WITH A
 2403                                   ;HEADER NOT FOUND FOR SECTOR 40
 2404  023356                           STARS
  (2)                                   ;;*************************************************************
 2405
 2406
 2407                                   .SBTTL  **TEST 22** - FORCE HDR NT FND AT END OF TRACK
 2408
 2409  023356                           BGNTST                                  ;**START OF TEST**
 2410
 2411
 2412  023356  004737  015766                   JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 2413  023362                                   CKERFG                  ;HEADS GO HOME OKAY
  (4)  023370  104432                           TRAP    C$EXIT
  (4)  023372  000126                           .WORD   L10060-.
 2414
 2415  023374                                   BGNSEG                          ;%%START OF SEGMENT%%
  (3)  023374  104404                           TRAP    C$BSEG
 2416
 2417  023376  012737  000047  002300           MOV     #39.,GDDAT      ;CREATE LAST SECTOR
 2418  023404  013777  002300  156746           MOV     GDDAT,@RLDA     ;LOAD DISK ADDRESS
 2419  023412  012777  177577  156742           MOV     #-129.,@RLMP    ;WORD COUNT
 2420  023420  012777  003426  156730           MOV     #BUF,@RLBA      ;BUS ADDRESS
 2421  023426  004537  015056                   JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
 2422  023432  000014                           READ                    ;READ
 2423  023434  004537  015702                   JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
 2424  023440                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  023440  104410                           TRAP    C$ESCAPE
  (3)  023442  000054                           .WORD   10000$-.
 2425
 2426  023444  013737  002340  002302           MOV     E.CS,BDDAT      ;READ CS
 2427  023452  042737  001777  002302           BIC     #1777,BDDAT     ;SAVE ERROR BITS
 2428  023460  022737  112000  002302           CMP     #112000,BDDAT   ;HDR NOT FOUND SET?
 2429  023466  001402                           BEQ     4$              ;YES, CONTINUE
 2430  023470  004537  014614                     JSR     R5,CHERR
 2431  023474                             4$:     CKLOOP
  (3)  023474  104406                             TRAP    C$CLP1
 2432
 2433  023476  022737  112000  002302             CMP     #112000,BDDAT
 2434  023504  001404                             BEQ     1$
 2435
 2436  023506                                     ERRDF   30.,EM23,ERRO   ;HEADER NOT FOUND DID NOT SET
  (4)  023506  104455                             TRAP    C$ERDF
  (5)  023510  000036                             .WORD   30
  (5)  023512  005540                             .WORD   EM23
  (5)  023514  007510                             .WORD   ERRO
 2437
 2438  023516                             1$:
 2439
 2440  023516                                     ENDSEG                            ;%%END OF SEGMENT%%
  (3)  023516                             10000$:
  (3)  023516  104405                             TRAP    C$ESEG
 2441  023520                             ENDTST                                    ;**END OF TEST**
  (3)  023520                             L10060:
  (3)  023520  104401                             TRAP    C$ETST
 2442
 2443                                     .SBTTL  **TEST 23** - FORCE NON-EXISTENT MEMORY ERROR
 2444
 2445  023522                             BGNTST                                    ;**START OF TEST**
 2446
 2447  023522                             STARS
  (2)                                     ;;*************************************************************
 2448                                     ;CHECK FOR RLV-11
 2449                                     ; &
 2450                                     ;SIZE IF MEMORY >= 124K - IF TRUE DO NOT PERFORM TESTS 23 & 24
 2451  023522                             STARS
  (2)                                     ;;*************************************************************
 2452
 2453  023522  005037  002662                     CLR     NOTST           ;INIT ABORT TEST
 2454  023526  005737  002420                     TST     T.CNTLR         ;RLV11?
 2455  023532  001013                             BNE     4$              ;BRANCH - IF NO
 2456  023534  013700  002120                     MOV     L$HIMEM,RO      ;GET HIGHEST OCTAL MEMORY ADDRESS IN PAR FORMAT
 2457  023540  006200                             ASR     RO              ;DIVIDE BY
 2458  023542  006200                             ASR     RO              ;32(10),40(8)
 2459  023544  006200                             ASR     RO              ;TO CONVERT TO
 2460  023546  006200                             ASR     RO              ;1K(10)
 2461  023550  006200                             ASR     RO              ;BLOCKS
 2462  023552  005200                             INC     RO              ;TO INCLUDE LOCATION ZERO
 2463  023554  022700  000174                     CMP     #124.,RO        ;MEMORY >= 124K.?
 2464  023560  003447                             BLE     5$              ;BRANCH - IF YES
 2465
 2466
 2467  023562                             STARS
  (2)                                     ;;*************************************************************
 2468                                     ;FORCE A NON-EXISTENT MEMORY ERROR,
 2469                                     ;WE SET THE RLBA TO EQUAL THE
 2470                                     ;LAST ADDRESS IN MEMORY AND ISSUE A READ.  THE
 2471                                     ;READ SHOULD ABORT AFTER ONE WORD TRANSFERRED
 2472  023562                             STARS
  (2)                                     ;;*************************************************************
```

```
2473
2474
2475  023562  004737  015766           4$:     JSR     PC,HDHOME          ;HEADS OVER TRACK 0
2476  023566                                   CKERFG                     ;HEADS GO HOME OKAY
 (4)  023574  104432                           TRAP    C$EXIT
 (4)  023576  000106                           .WORD   L10061-.
2477
2478  023600                                   BGNSEG                     ;%%START OF SEGMENT%%
 (3)  023600  104404                           TRAP    C$BSEG
2479
2480  023602  012777  160000  156546           MOV     #160000,@RLBA      ;LEAD BA
2481  023610  012737  000060  002374           MOV     #BA16!BA17,XMEM    ;SET EA BIT
2482  023616  005077  156536                   CLR     @RLDA              ;LOAD DISK AVAILABLE
2483  023622  012777  177600  156532           MOV     #-128.,@RLMP       ;WORD COUNT
2484  023630  004537  015056                   JSR     R5,LDFUNC                  ;LOAD THE FUNCTION IN NEXT WORD
2485  023634  000014                           READ                       ;READ
2486  023636  004537  015702                   JSR     R5,WTCRDY          ;WAIT FOR CONTROLLER
2487  023642                                   ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  023642  104410                           TRAP    C$ESCAPE
 (3)  023644  000026                           .WORD   10000$-.
2488  023646  032737  020000  002340           BIT     #NXM,E.CS          ;DID NXM SET?
2489  023654  001004                           BNE     3$                 ;YES, CONTINUE
2490  023656                                   ERRDF   31.,EM24,ERR0      ;NXM DID NOT SET
 (4)  023656  104455                           TRAP    C$ERDF
 (5)  023660  000037                           .WORD   31
 (5)  023662  005616                           .WORD   EM24
 (5)  023664  007510                           .WORD   ERR0
2491  023666                           3$:     ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  023666  104410                           TRAP    C$ESCAPE
 (3)  023670  000002                           .WORD   10000$-.
2492  023672                                   ENDSEG                     ;%%END OF SEGMENT%%
 (3)  023672                           10000$:
 (3)  023672  104405                           TRAP    C$ESEG
2493  023674                                   EXIT    TST
 (3)  023674  104432                           TRAP    C$EXIT
 (3)  023676  000006                           .WORD   L10061-.
2494  023700  005237  002662           5$:     INC     NOTST              ;ABORT TEST 24
2495
2496  023704                           ENDTST                             ;**END OF TEST**
 (3)  023704                           L10061:
 (3)  023704  104401                           TRAP    C$ETST
2497
2498                                   .SBTTL  **TEST 24** - FORCE NON-EXISTENT MEMORY ERROR INTERRUPT
2499
2500  023706                           BGNTST                             ;**START OF TEST**
2501  023706                           STARS
 (2)                                   ;;*****************************************************************
2502                                   ;CHECK THAT WE CAN FORCE AN INTERRUPT WITH A
2503                                   ;NON-EXISTENT MEMORY ERROR.
2504  023706                           STARS
 (2)                                   ;;*****************************************************************
2505
2506
2507  023706  005737  002662                   TST     NOTST              ;RLV-11 & MEMORY SIZE >= 124K.?
2508  023712  001066                           BNE     1$                 ;BRANCH - IF YES
2509  023714  004737  015766                   JSR     PC,HDHOME          ;HEADS OVER TRACK 0
```

```
 2510  023720                                  CKERFG                          ;HEADS GO HOME OKAY
  (4)  023726  104432                          TRAP     C$EXIT
  (4)  023730  000140                          .WORD    L10062-.
 2511
 2512  023732                                  BGNSEG                                    ;%%START OF SEGMENT%%
  (3)  023732  104404                          TRAP     C$BSEG
 2513
 2514  023734  005037  002256                  CLR      INTFLG                 ;CLEAR INTERRUPT OCCURANCE FLAG
 2515  023740                                  SETPRI   #PRI00
  (3)  023740  012700  000000                  MOV      #PRI00,R0
  (3)  023744  104441                          TRAP     C$SPRI
 2516  023746  012777  160000  156402          MOV      #160000,@RLBA          ;PRELOAD BA
 2517  023754  012737  000060  002374          MOV      #BA16!BA17,XMEM        ;SET EA BITS
 2518  023762  005077  156372                  CLR      @RLDA                  ;LOAD DA
 2519  023766  012777  177777  156366          MOV      #-1,@RLMP              ;WORD COUNT
 2520  023774  004537  015056                  JSR      R5,LDFUNC              ;LOAD THE FUNCTION IN NEXT WORD
 2521  024000  000114                          READ!INTEN                      ;READ
 2522  024002  004537  015702                  JSR      R5,WTCRDY              ;WAIT FOR CONTROLLER
 2523  024006                                  SETPRI   #PRI07                 ;PRIORITY TO 7
  (3)  024006  012700  000340                  MOV      #PRI07,R0
  (3)  024012  104441                          TRAP     C$SPRI
 2524  024014                                  ESCAPE   SEG                    ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  024014  104410                          TRAP     C$ESCAPE
  (3)  024016  000050                          .WORD    10000$-.
 2525  024020  005737  002256                  TST      INTFLG                 ;INTERRUPT OCCUR?
 2526  024024  001004                          BNE      4$                     ;YES OKAY
 2527  024026                                  ERRDF    32.,EM44,ERR0          ;NO INTERRUPT W/NXM
  (4)  024026  104455                          TRAP     C$ERDF
  (5)  024030  000040                          .WORD    32
  (5)  024032  006522                          .WORD    EM44
  (5)  024034  007510                          .WORD    ERR0
 2528  024036                          4$:     ESCAPE   SEG                    ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  024036  104410                          TRAP     C$ESCAPE
  (3)  024040  000026                          .WORD    10000$-.
 2529  024042  032737  020000  002340          BIT      #NXM,E.CS              ;DID NXM SET?
 2530  024050  001004                          BNE      3$                     ;YES, CONTINUE
 2531  024052                                  ERRDF    33.,EM24,ERR0          ;NO NXM
  (4)  024052  104455                          TRAP     C$ERDF
  (5)  024054  000041                          .WORD    33
  (5)  024056  005616                          .WORD    EM24
  (5)  024060  007510                          .WORD    ERR0
 2532  024062                          3$:     ESCAPE   SEG                    ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  024062  104410                          TRAP     C$ESCAPE
  (3)  024064  000002                          .WORD    10000$-.
 2533  024066                                  ENDSEG                          ;%%END OF SEGMENT%%
  (3)  024066                          10000$:
  (3)  024066  104405                          TRAP     C$ESEG
 2534  024070                          1$:
 2535
 2536  024070                          ENDTST                                  ;**END OF TEST**
  (3)  024070                          L10062:
  (3)  024070  104401                          TRAP     C$ETST
 2537
 2538                                  .SBTTL  **TEST 25** - CHECK READ WRITE LOOP
 2539
 2540
```

```
      024072                             BGNTST                                            ;**START OF TEST**

      024072                             STARS
 (2)                                     ;;*****************************************************************
                                         ;VERIFY THAT THE WRITE ACTUALLY WRITES.  AT THIS
                                         ;TIME WE KNOW THAT THE WRITE FUNCTION GOES THRU
                                         ;THE MOTIONS BUT WE DON'T KNOW THAT THE DATA
                                         ;ACTUALLY GETS RECORDED ON THE PLATTER.
      024072                             STARS
 (2)                                     ;;*****************************************************************


      024072  004737  015766                     JSR     PC,HDHOME          ;HEADS OVER TRACK 0
      024076                                     CKERFG                     ;HEADS GO HOME OKAY
 (4)  024104  104432                             TRAP    C$EXIT
 (4)  024106  000362                             .WORD   L10063-.

      024110                                     BGNSEG                              ;%%START OF SEGMENT%%
 (3)  024110  104404                             TRAP    C$BSEG

      024112  012700  003426                     MOV     #BUF,R0            ;SET UP WRITE BUFFER
      024116  012701  000200                     MOV     #128.,R1           ;128 WORDS/ONE SECTOR
      024122  012720  125252             3$:     MOV     #125252,(R0)+      ;WRITE PATTERN TO BUFFER
      024126  005301                             DEC     R1                 ;DONE?
      024130  001374                             BNE     3$                 ;NO, BRANCH BACK
      024132  005077  156222                     CLR     @RLDA              ;DISK ADDRESS
      024136  012777  177600  156216             MOV     #-128.,@RLMP       ;WORD COUNT
      024144  012777  003426  156204             MOV     #BUF,@RLBA         ;BUS ADDRESS
      024152  004537  015056                     JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
      024156  000012                             WRITE                      ;WRITE THE PATTERN
      024160  004537  015702                     JSR     R5,WTCRDY          ;WAIT FOR CONTROLLER READY
      024164                                     ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  024164  104410                             TRAP    C$ESCAPE
 (3)  024166  000300                             .WORD   10000$-.

      024170  004537  014614                     JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
      024174                                     ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  024174  104410                             TRAP    C$ESCAPE
 (3)  024176  000270                             .WORD   10000$-.
      024200                                     BGNSEG                              ;%%START OF SEGMENT%%
 (3)  024200  104404                             TRAP    C$BSEG
      024202  012700  003426                     MOV     #BUF,R0            ;CLEAR OUT BUFFER BEFORE
      024206  012701  000200                     MOV     #128.,R1           ;READING
      024212  005020                     4$:     CLR     (R0)+              ;CLEAR BUFFER
      024214  005301                             DEC     R1                 ;DONE?
      024216  001375                             BNE     4$                 ;NO, BRANCH BACK
      024220  005077  156134                     CLR     @RLDA              ;LOAD DISK ADDRESS
      024224  012777  177600  156130             MOV     #-128.,@RLMP       ;WORD COUNT/ONE SECTION
      024232  012777  003426  156116             MOV     #BUF,@RLBA         ;LOAD BUS ADDRESS
      024240  004537  015056                     JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
      024244  000014                             READ                       ;GO READ
      024246  004537  015702                     JSR     R5,WTCRDY          ;WAIT FOR CONTROLLER READY
      024252                                     ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  024252  104410                             TRAP    C$ESCAPE
```

```
   (3)  024254  000210                            .WORD    10001$-.
  2586
  2587  024256  004537  014614                    JSR      R5,CHERR                 ;CHECK CNTLR FOR ERRORS
  2588  024262  005737  002236                    TST      T.CRC            ;WAS ERROR A DCK??
  2589  024266  001003                            BNE      8$               ;YES,SEE IF WE A DUMP
  2590  024270                           10$:     ESCAPE   SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  024270  104410                            TRAP     C$ESCAPE
   (3)  024272  000172                            .WORD    10001$-.
  2591  024274  000404                            BR       99$              ;SKIP AROUND
  2592  024276  005737  012440           8$:      TST      T.DMP            ;DO WE STILL WANT TO CHECK IT
  2593  024302  001772                            BEQ      10$              ;NO
  2594  024304                                    CKLOOP                    ;YES, CHECK FOR LOOP FIRST
   (3)  024304  104406                            TRAP     C$CLP1
  2595
  2596  024306  005037  002242           99$:     CLR      CDCNT            ;CLEAR NUMBER WE'RE TO PRINT
  2597  024312  005037  002234                    CLR      CHECK            ;ALLOW HEADER ON FIRST PRINT
  2598  024316  012702  003426                    MOV      #BUF,R2          ;COMPARE BUFFER TO CHECK WRITE
  2599  024322  012701  000200                    MOV      #128.,R1         ;128 WORDS
  2600  024326  012737  125252  002300            MOV      #125252,GDDAT    ;SET UP EXPECTED
  2601  024334  011237  002302           5$:      MOV      (R2),BDDAT       ;GET DATA
  2602  024340  023737  002300  002302            CMP      GDDAT,BDDAT      ;IS DATA OKAY
  2603  024346  001442                            BEQ      6$               ;YES, CONTINUE
  2604  024350  010237  002274                    MOV      R2,TMP1          ;LOAD BAD MEM LOCATION
  2605  024354  023737  002242  012442            CMP      CDCNT,T.LMT              ;CHECKED ENOUGH??
  2606  024362  001002                            BNE      333$             ;NO
  2607  024364                                    ESCAPE   SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  024364  104410                            TRAP     C$ESCAPE
   (3)  024366  000076                            .WORD    10001$-.
  2608  024370  005237  002242           333$:    INC      CDCNT            ;ACCOUNT FOR IT
  2609
  2610  024374  005737  002234                    TST      CHECK            ;HEADER OR JUST DATA
  2611  024400  001007                            BNE      9$               ;JUST DATA
  2612  024402                                    ERRDF    34.,EM25,ERR8    ;BAD DATA
   (4)  024402  104455                            TRAP     C$ERDF
   (5)  024404  000042                            .WORD    34
   (5)  024406  005656                            .WORD    EM25
   (5)  024410  010030                            .WORD    ERR8
  2613  024412  005237  002234                    INC      CHECK            ;ACCOUNT FOR PRINT OF HEADER
  2614  024416  000416                            BR       6$
  2615
  2616  024420                           9$:      PRINTB #FRMT6,TMP1,GDDAT,BDDAT
  (10)  024420  013746  002302                    MOV     BDDAT,-(SP)
   (9)  024424  013746  002300                    MOV     GDDAT,-(SP)
   (8)  024430  013746  002274                    MOV     TMP1,-(SP)
   (7)  024434  012746  011277                    MOV     #FRMT6,-(SP)
   (6)  024440  012746  000004                    MOV     #4,-(SP)
   (3)  024444  010600                            MOV     SP,R0
   (4)  024446  104414                            TRAP    C$PNTB
   (4)  024450  062706  000012                    ADD     #12,SP
  2617
  2618  024454                           6$:      CKLOOP
   (3)  024454  104406                            TRAP     C$CLP1
  2619  024456  005722                   7$:      TST      (R2)+            ;BUMP BUFFER POINTER
  2620  024460  005301                            DEC      R1               ;DONE?
  2621  024462  001324                            BNE      5$               ;NO, GO BACK
  2622  024464                                    ENDSEG                            ;%%END OF SEGMENT%%
  (3)  024464                           10001$:
  (3)  024464  104405                           TRAP    C$ESEG
 2623  024466                                   ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  024466                           10000$:
  (3)  024466  104405                           TRAP    C$ESEG
 2624  024470                           ENDTST                                          ;**END OF TEST**
  (3)  024470                           L10063:
  (3)  024470  104401                           TRAP    C$ETST
 2625
 2626                                   .SBTTL  **TEST 26** - CHECK SILO LINES
 2627
 2628  024472                           BGNTST                                          ;**START OF TEST**
 2629
 2630
 2631
 2632  024472                           STARS
  (2)                                   ;;*********************************************************************
 2633                                   ;TEST THAT LINES IN / TO SILO ARE GOOD, THAT IS THAT EACH LINE IS
 2634                                   ;GOOD AND CAN BE AT EITHER A 1 OR A 0 STATE INDEPENDENTLY OF EACH
 2635                                   ;OTHER BIT POSITION THIS IS DONE BY WRITING PATTERNS OF FLOATING 1,
 2636                                   ;FLOATING 0, WALKING 0, WALKING 1
 2637  024472                           STARS
  (2)                                   ;;*********************************************************************
 2638
 2639
 2640  024472  004737  015766                   JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 2641  024476                                   CKERFG                  ;HEADS GO HOME OKAY
  (4)  024504  104432                           TRAP    C$EXIT
  (4)  024506  000404                           .WORD   L10064-.
 2642
 2643  024510  012703  003236                   MOV     #DATPAT,R3
 2644
 2645
 2646  024514                                   BGNSEG                                  ;%%START OF SEGMENT%%
  (3)  024514  104404                           TRAP    C$BSEG
 2647  024516  012700  003426           6$:     MOV     #BUF,R0         ;WRITE PATTERN INTO MEMORY
 2648  024522  012701  000200                   MOV     #128.,R1        ;128 WORDS
 2649  024526  011320                   2$:     MOV     (R3),(R0)+      ;WRITE THE PATTERN
 2650  024530  005301                           DEC     R1              ;DONE?
 2651  024532  001375                           BNE     2$              ;NO GO BACK
 2652
 2653  024534  012777  003426  155614           MOV     #BUF,@RLBA      ;SETUP TO WRITE PATTERN ONTO DISK
 2654  024542  005077  155612                   CLR     @RLDA           ;LOAD DA
 2655  024546  012777  177600  155606           MOV     #-128.,@RLMP    ;WORD COUNT
 2656  024554  004537  015056                   JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
 2657  024560  000012                           WRITE
 2658  024562  004537  015702                   JSR     R5,WTCRDY
 2659  024566                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  024566  104410                           TRAP    C$ESCAPE
  (3)  024570  000320                           .WORD   10000$-.
 2660  024572  004537  014614                   JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
 2661  024576                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  024576  104410                           TRAP    C$ESCAPE
  (3)  024600  000310                           .WORD   10000$-.
 2662  024602                                   BGNSEG                                  ;%%START OF SEGMENT%%
  (3)  024602  104404                           TRAP    C$BSEG
 2663  024604  012700  003426                    MOV     #BUF,R0          ;CLEAR MEMORY BEFORE READING IT BACK
 2664  024610  012701  000200                    MOV     #128.,R1         ;128 WORDS
 2665  024614  005020                   3$:      CLR     (R0)+            ;CLEAR
 2666  024616  005301                            DEC     R1               ;EONE
 2667  024620  001375                            BNE     3$               ;NO
 2668
 2669  024622  012777  003426  155526            MOV     #BUF,@RLBA       ;SETUP TO READ IT BACK
 2670  024630  012777  177600  155524            MOV     #-128.,@RLMP     ;128 WORDS
 2671  024636  005077  155516                    CLR     @RLDA            ;SECTOR ZERO
 2672  024642  004537  015056                    JSR     R5,LDFUNC                ;LOAD THE FUNCTION IN NEXT WORD
 2673  024646  000014                            READ
 2674  024650  004537  015702                    JSR     R5,WTCRDY
 2675  024654                                    ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  024654  104410                            TRAP    C$ESCAPE
  (3)  024656  000224                            .WORD   10001$-.
 2676  024660  004537  014614                    JSR     R5,CHERR                 ;CHECK CNTLR FOR ERRORS
 2677  024664  005737  002236                    TST     T.CRC            ;WAS ERROR A DCK??
 2678  024670  001003                            BNE     8$               ;YES,SEE IF WE A DUMP
 2679  024672                          10$:      ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  024672  104410                            TRAP    C$ESCAPE
  (3)  024674  000206                            .WORD   10001$-.
 2680  024676  000404                            BR      99$              ;SKIP AROUND
 2681  024700  005737  012440           8$:      TST     T.DMP            ;DO WE STILL WANT TO CHECK IT
 2682  024704  001772                            BEQ     10$              ;NO
 2683  024706                                    CKLOOP                   ;YES, CHECK FOR LOOP FIRST
  (3)  024706  104406                            TRAP    C$CLP1
 2684
 2685  024710  005037  002242           99$:     CLR     CDCNT            ;CLEAR NUMBER WE'RE TO PRINT
 2686  024714  005037  002234                    CLR     CHECK            ;ALLOW HEADER ON FIRST PRINT
 2687  024720  011337  002300                    MOV     (R3),GDDAT       ;COMPARE WHAT WE READ BACK
 2688  024724  012737  003426  002276            MOV     #BUF,TMP2        ;BUFFER START
 2689  024732  012737  000001  002274            MOV     #1,TMP1          ;START WITH FIRST
 2690
 2691  024740  017737  155332  002302   5$:      MOV     @TMP2,BDDAT      ;GET DATA
 2692  024746  023737  002300  002302            CMP     GDDAT,BDDAT      ;GOOD?
 2693  024754  001440                            BEQ     4$               ;YES, BRANCH
 2694
 2695  024756  023737  002242  012442            CMP     CDCNT,T.LMT              ;CHECKED ENOUGH??
 2696  024764  001002                            BNE     333$             ;NO
 2697  024766                                    ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  024766  104410                            TRAP    C$ESCAPE
  (3)  024770  000112                            .WORD   10001$-.
 2698  024772  005237  002242           333$:    INC     CDCNT            ;ACCOUNT FOR IT
 2699
 2700  024776  005737  002234                    TST     CHECK            ;HEADER OR JUST DATA
 2701  025002  001007                            BNE     9$               ;JUST DATA
 2702  025004                                    ERRDF   35.,EM45,ERR10   ;BAD DATA BACK
  (4)  025004  104455                            TRAP    C$ERDF
  (5)  025006  000043                            .WORD   35
  (5)  025010  006554                            .WORD   EM45
  (5)  025012  010146                            .WORD   ERR10
 2703
 2704  025014  005237  002234                    INC     CHECK            ;ACCOUNT FOR PRINT OF HEADER
 2705  025020  000416                            BR      4$
 2706
 2707  025022                          9$:       PRINTB #FRMT7,TMP1,GDDAT,BDDAT
```

```
(10) 025022  013746  002302                     MOV     BDDAT,-(SP)
 (9) 025026  013746  002300                     MOV     GDDAT,-(SP)
 (8) 025032  013746  002274                     MOV     TMP1,-(SP)
 (7) 025036  012746  011354                     MOV     #FRMT7,-(SP)
 (6) 025042  012746  000004                     MOV     #4,-(SP)
 (3) 025046  010600                             MOV     SP,R0
 (4) 025050  104414                             TRAP    C$PNTB
 (4) 025052  062706  000012                     ADD     #12,SP
     025056                          4$:        CKLOOP
 (3) 025056  104406                             TRAP    C$CLP1

     025060  062737  000002  002276             ADD     #2,TMP2           ;NEXT LOCATION
     025066  005237  002274                     INC     TMP1              ;NEXT WORD
     025072  023727  002274  000201             CMP     TMP1,#129.        ;DONE
     025100  001317                             BNE     5$                ;NO, GO BACK

     025102                                     ENDSEG                              ;%%END OF SEGMENT%%
 (3) 025102                          10001$:
 (3) 025102  104405                             TRAP    C$ESEG

     025104  005723                             TST     (R3)+             ;DONE ALL PATTERNS
     025106  001203                             BNE     6$                ;NO, GO BACK

     025110                                     ENDSEG                              ;%%END OF SEGMENT%%
 (3) 025110                          10000$:
 (3) 025110  104405                             TRAP    C$ESEG
     025112                          ENDTST                                         ;**END OF TEST**
 (3) 025112                          L10064:
 (3) 025112  104401                             TRAP    C$ETST

                                     .SBTTL     **TEST 27** - CHECK THROUGHPUT OF SILO

     025114                          BGNTST                                         ;**START OF TEST**



     025114                          STARS
 (2)                                 ;;*************************************************************************
                                     ;TEST THAT THE SILO OPERATES CORRECTLY. WE WILL WRITE A PATTERN
                                     ;THAT CONTAINS A UNIQUE PATTERN IN EACH LOCATION. WE EXPECT IT
                                     ;BACK IN PROPER ORDER. WE DO A ONE SECTOR TRANSFER.
     025114                          STARS
 (2)                                 ;;*************************************************************************


     025114  004737  015766                     JSR     PC,HDHOME         ;HEADS OVER TRACK 0
     025120                                     CKERFG                    ;HEADS GO HOME OKAY
 (4) 025126  104432                             TRAP    C$EXIT
 (4) 025130  000410                             .WORD   L10065-.

     025132                                     BGNSEG                              ;%%START OF SEGMENT%%
 (3) 025132  104404                             TRAP    C$BSEG


     025134  012700  000001                     MOV     #1,R0             ;INITIAL 1
     025140  012701  000200                     MOV     #128.,R1          ;128 WORDS
 2744  025144  012702  003426                   MOV     #BUF,R2          ;BUFFER
 2745  025150  010022                  2$:      MOV     R0,(R2)+         ;WRITE A WORD
 2746  025152  005200                           INC     R0               ;NEXT PATTERN (1-128)
 2747  025154  005301                           DEC     R1               ;DONE
 2748  025156  001374                           BNE     2$               ;NO
 2749
 2750  025160  012777  003426  155170           MOV     #BUF,@RLBA       ;SETUP TO WRITE
 2751  025166  012777  177600  155166           MOV     #-128.,@RLMP     ;128 WORDS
 2752  025174  005077  155160                   CLR     @RLDA            ;DISK ADDRESS 0
 2753  025200  004537  015056                   JSR     R5,LDFUNC                 ;LOAD THE FUNCTION IN NEXT WORD
 2754  025204  000012                           WRITE
 2755  025206  004537  015702                   JSR     R5,WTCRDY
 2756  025212                                   ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  025212  104410                           TRAP    C$ESCAPE
  (3)  025214  000322                           .WORD   10000$-.
 2757
 2758  025216  004537  014614                   JSR     R5,CHERR                  ;CHECK CNTLR FOR ERRORS
 2759  025222                                   ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  025222  104410                           TRAP    C$ESCAPE
  (3)  025224  000312                           .WORD   10000$-.
 2760  025226                                   BGNSEG                            ;%%START OF SEGMENT%%
  (3)  025226  104404                           TRAP    C$BSEG
 2761  025230  012700  003426                   MOV     #BUF,R0          ;CLEAR BUFFER
 2762  025234  012701  000200                   MOV     #128.,R1         ;128 IN LENGTH
 2763  025240  005020                  3$:      CLR     (R0)+            ;CLEAR
 2764  025242  005301                           DEC     R1               ;DOWN COUNT
 2765  025244  001375                           BNE     3$               ;DONE?
 2766
 2767  025246  012777  003426  155102           MOV     #BUF,@RLBA       ;BUS ADDRESS
 2768  025254  012777  177600  155100           MOV     #-128.,@RLMP     ;WORD COUNT
 2769  025262  005077  155072                   CLR     @RLDA            ;DISK ADDRESS
 2770  025266  004537  015056                   JSR     R5,LDFUNC                 ;LOAD THE FUNCTION IN NEXT WORD
 2771  025272  000014                           READ
 2772  025274  004537  015702                   JSR     R5,WTCRDY
 2773  025300                                   ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  025300  104410                           TRAP    C$ESCAPE
  (3)  025302  000232                           .WORD   10001$-.
 2774
 2775  025304  004537  014614                   JSR     R5,CHERR                  ;CHECK CNTLR FOR ERRORS
 2776  025310  005737  002236                   TST     T.CRC            ;WAS ERROR A DCK??
 2777  025314  001003                           BNE     8$               ;YES,SEE IF WE A DUMP
 2778  025316                          10$:     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  025316  104410                           TRAP    C$ESCAPE
  (3)  025320  000214                           .WORD   10001$-.
 2779  025322  000404                           BR      99$              ;SKIP AROUND
 2780  025324  005737  012440          8$:      TST     T.DMP            ;DO WE STILL WANT TO CHECK IT
 2781  025330  001772                           BEQ     10$              ;NO
 2782  025332                                   CKLOOP                   ;YES, CHECK FOR LOOP FIRST
  (3)  025332  104406                           TRAP    C$CLP1
 2783
 2784  025334  005037  002242          99$:     CLR     CDCNT            ;CLEAR NUMBER WE'RE TO PRINT
 2785  025340  005037  002234                   CLR     CHECK            ;ALLOW HEADER ON FIRST PRINT
 2786  025344  012737  000001  002300           MOV     #1,GDDAT         ;START GOOD AT 1
 2787  025352  012737  003426  002276           MOV     #BUF,TMP2        ;START OF BUFFER
 2788  025360  012737  000001  002274           MOV     #1,TMP1          ;FIRST WORD
 2789
 2790  025366  017737  154704  002302   4$:       MOV     @TMP2,BDDAT       ;GET WORD
 2791  025374  023737  002302  002300             CMP     BDDAT,GDDAT       ;CORRECT?
 2792  025402  001440                             BEQ     6$                ;YES
 2793
 2794  025404  023737  002242  012442             CMP     CDCNT,T.LMT                 ;CHECKED ENOUGH??
 2795  025412  001002                             BNE     333$              ;NO
 2796  025414                                     ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  025414  104410                             TRAP    C$ESCAPE
  (3)  025416  000116                             .WORD   10001$-.
 2797  025420  005237  002242           333$:     INC     CDCNT             ;ACCOUNT FOR IT
 2798
 2799  025424  005737  002234                     TST     CHECK             ;HEADER OR JUST DATA
 2800  025430  001007                             BNE     9$                ;JUST DATA
 2801  025432                                     ERRDF   36.,EM47,ERR10    ;BAD DATA
  (4)  025432  104455                             TRAP    C$ERDF
  (5)  025434  000044                             .WORD   36
  (5)  025436  006604                             .WORD   EM47
  (5)  025440  010146                             .WORD   ERR10
 2802  025442  005237  002234                     INC     CHECK             ;ACCOUNT FOR PRINT OF HEADER
 2803  025446  000416                             BR      6$
 2804
 2805  025450                           9$:       PRINTB  #FRMT7,TMP1,GDDAT,BDDAT
 (10)  025450  013746  002302                     MOV     BDDAT,-(SP)
  (9)  025454  013746  002300                     MOV     GDDAT,-(SP)
  (8)  025460  013746  002274                     MOV     TMP1,-(SP)
  (7)  025464  012746  011354                     MOV     #FRMT7,-(SP)
  (6)  025470  012746  000004                     MOV     #4,-(SP)
  (3)  025474  010600                             MOV     SP,R0
  (4)  025476  104414                             TRAP    C$PNTB
  (4)  025500  062706  000012                     ADD     #12,SP
 2806  025504                           6$:       CKLOOP
  (3)  025504  104406                             TRAP    C$CLP1
 2807
 2808  025506  062737  000002  002276             ADD     #2,TMP2           ;NEXT
 2809  025514  005237  002274                     INC     TMP1              ;NEXT
 2810  025520  005237  002300                     INC     GDDAT             ;NEXT
 2811  025524  023727  002274  000201             CMP     TMP1,#129.        ;DONE?
 2812  025532  001315                             BNE     4$
 2813
 2814  025534                                     ENDSEG                              ;%%END OF SEGMENT%%
  (3)  025534                           10001$:
  (3)  025534  104405                             TRAP    C$ESEG
 2815
 2816  025536                                     ENDSEG                              ;%%END OF SEGMENT%%
  (3)  025536                           10000$:
  (3)  025536  104405                             TRAP    C$ESEG
 2817  025540                           ENDTST                                        ;**END OF TEST**
  (3)  025540                           L10065:
  (3)  025540  104401                             TRAP    C$ETST
```

```
                                        .SBTTL  **TEST 28** - CHECK ZERO FILL ON WRITE

      025542                            BGNTST                                                  ;**START OF TEST**



      025542                            STARS
 (2)                                    ;;*******************************************************************
                                        ;WHEN WRITING PARTIAL SECTORS (LESS THAN 128 WORDS) THE
                                        ;CONTROLLER WILL FILL IN THE REMAINING PORTION OF
                                        ;THE SECTOR WITH ZERO WORDS.  CHECK THIS FEATURE
                                        ;WITH WORD COUNTS FROM 1 TO 127
      025542                            STARS
 (2)                                    ;;*******************************************************************

      025542  004737  015766                     JSR     PC,HDHOME          ;HEADS OVER TRACK 0
      025546                                     CKERFG                     ;HEADS GO HOME OKAY
 (4)  025554  104432                             TRAP    C$EXIT
 (4)  025556  000442                             .WORD   L10066-.

      025560                                     BGNSEG                              ;%%START OF SEGMENT%%
 (3)  025560  104404                             TRAP    C$BSEG

      025562  012737  000001  002274             MOV     #1,TMP1            ;START WITH 1 WORD WRITE
      025570  012700  003426          35$:       MOV     #BUF,R0            ;WRITE BUFFER WITH 52525, WE'LL
      025574  012701  000200                     MOV     #128.,R1           ;WRITE 128 WORDS ALL THOUGH WE'RE
      025600  012720  052525          3$:        MOV     #52525,(R0)+       ;ONLY GOING TO TRANSFER < 128
      025604  005301                             DEC     R1                 ;DONE WITH BUFFER?
      025606  001374                             BNE     3$                 ;NO, GO BACK
      025610  013700  002274          33$:       MOV     TMP1,R0            ;GET TRANSFER WORD COUNT
      025614  005400                             NEG     R0                 ;NEGATE FOR RLMP
      025616  010077  154540                     MOV     R0,@RLMP           ;STORE WORD COUNT AWAY
      025622  012777  003426  154526             MOV     #BUF,@RLBA         ;SET UP RLBA
      025630  005077  154524                     CLR     @RLDA
      025634  004537  015056                     JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
      025640  000012                             WRITE                      ;WRITE IT
      025642  004537  015702                     JSR     R5,WTCRDY          ;WAIT FOR WRITE TO FINISH
      025646                                     ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  025646  104410                             TRAP    C$ESCAPE
 (3)  025650  000346                             .WORD   10000$-.

      025652  004537  014614                     JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
      025656                                     ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  025656  104410                             TRAP    C$ESCAPE
 (3)  025660  000336                             .WORD   10000$-.
      025662                                     BGNSEG                              ;%%START OF SEGMENT%%
 (3)  025662  104404                             TRAP    C$BSEG
      025664  012700  003426                     MOV     #BUF,R0            ;WE'RE GOING TO OVERLAY BUFFER BEFORE
      025670  012701  000200                     MOV     #128.,R1           ;READING IT BACK.
      025674  012720  125252          18$:       MOV     #125252,(R0)+      ;OVERLAY IT WITH COMPLIMENT
      025700  005301                             DEC     R1                 ;DONE?
      025702  001374                             BNE     18$                ;NO, KEEP GOING
      025704  012777  003426  154444             MOV     #BUF,@RLBA         ;SET UP TO READ
      025712  012777  177600  154442             MOV     #-128.,@RLMP       ;128 WORDS TO CHECK ZERO FILL
      025720  005077  154434                     CLR     @RLDA              ;SECTOR
 2865  025724  004537  015056                   JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
 2866  025730  000014                           READ
 2867  025732  004537  015702                   JSR     R5,WTCRDY       ;WAIT TIL WE FINISH THE READ
 2868  025736                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  025736  104410                           TRAP    C$ESCAPE
  (3)  025740  000234                           .WORD   10001$-.
 2869
 2870  025742  004537  014614                   JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
 2871  025746  005737  002236                   TST     T.CRC           ;WAS ERROR A DCK??
 2872  025752  001003                           BNE     8$              ;YES,SEE IF WE A DUMP
 2873  025754                           10$:    ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  025754  104410                           TRAP    C$ESCAPE
  (3)  025756  000216                           .WORD   10001$-.
 2874  025760  000404                           BR      99$             ;SKIP AROUND
 2875  025762  005737  012440           8$:     TST     T.DMP           ;DO WE STILL WANT TO CHECK IT
 2876  025766  001772                           BEQ     10$             ;NO
 2877  025770                                   CKLOOP                  ;YES, CHECK FOR LOOP FIRST
  (3)  025770  104406                           TRAP    C$CLP1
 2878  025772  005037  002242           99$:    CLR     CDCNT           ;CLEAR NUMBER WE'RE TO PRINT
 2879  025776  005037  002234                   CLR     CHECK           ;ALLOW HEADER ON FIRST PRINT
 2880  026002  013702  002274                   MOV     TMP1,R2         ;WORDS WRITTEN IN R2
 2881  026006  012701  000200                   MOV     #128.,R1        ;CHECK 128 WORDS
 2882
 2883  026012  012703  003426                   MOV     #BUF,R3         ;SET UP BUFFER BEGINNING
 2884  026016  005037  002276                   CLR     TMP2            ;ZERO WORD COUNT
 2885  026022  012737  052525  002300           MOV     #52525,GDDAT    ;SET UP EXPECTED
 2886  026030  011337  002302           4$:     MOV     (R3),BDDAT      ;GET WORD
 2887  026034  023737  002302  002300           CMP     BDDAT,GDDAT     ;IS WORD CORRECT?
 2888  026042  001441                           BEQ     12$             ;YES, GO CHECK COUNTS AND REPEAT
 2889
 2890  026044  023737  002242  012442           CMP     CDCNT,T.LMT             ;CHECKED ENOUGH??
 2891  026052  001002                           BNE     333$            ;NO
 2892  026054                                   ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  026054  104410                           TRAP    C$ESCAPE
  (3)  026056  000116                           .WORD   10001$-.
 2893  026060  005237  002242           333$:   INC     CDCNT           ;ACCOUNT FOR IT
 2894
 2895  026064  005737  002234                   TST     CHECK           ;HEADER OR JUST DATA
 2896  026070  001007                           BNE     9$              ;JUST DATA
 2897  026072                                   ERRDF   37.,EM27,ERR12
  (4)  026072  104455                           TRAP    C$ERDF
  (5)  026074  000045                           .WORD   37
  (5)  026076  005734                           .WORD   EM27
  (5)  026100  010272                           .WORD   ERR12
 2898  026102  005237  002234                   INC     CHECK           ;ACCOUNT FOR PRINT OF HEADER
 2899  026106  000417                           BR      12$
 2900
 2901  026110                           9$:     PRINTB #FRMT9,TMP1,R3,GDDAT,BDDAT
 (11)  026110  013746  002302                   MOV     BDDAT,-(SP)
 (10)  026114  013746  002300                   MOV     GDDAT,-(SP)
  (9)  026120  010346                           MOV     R3,-(SP)
  (8)  026122  013746  002274                   MOV     TMP1,-(SP)
  (7)  026126  012746  011547                   MOV     #FRMT9,-(SP)
  (6)  026132  012746  000005                   MOV     #5,-(SP)
  (3)  026136  010600                           MOV     SP,R0
  (4)  026140  104414                           TRAP    C$PNTB
```

```
   (4)  026142  062706  000014                  ADD     #14,SP
  2902  026146                          12$:    CKLOOP
   (3)  026146  104406                          TRAP    C$CLP1
  2903  026150  005723                  6$:     TST     (R3)+
  2904  026152  005237  002276                  INC     TMP2
  2905  026156  005301                          DEC     R1              ;DONE ALL WORDS?
  2906  026160  001405                          BEQ     7$              ;EXIT TEST
  2907  026162  005302                          DEC     R2              ;DONE CHECKING NON-ZERO WORDS
  2908  026164  003321                          BGT     4$              ;NO, BRANCH BACK
  2909  026166  005037  002300                  CLR     GDDAT           ;YES, SET EXP'D AS ZERO
  2910  026172  000716                          BR      4$              ;BRANCH BACK
  2911
  2912  026174                          7$:                             ;EXIT TEST
  2913  026174                                  ENDSEG                          ;%%END OF SEGMENT%%
   (3)  026174                          10001$:
   (3)  026174  104405                          TRAP    C$ESEG
  2914
  2915  026176  005237  002274                  INC     TMP1
  2916  026202  023727  002274  000200          CMP     TMP1,#128.
  2917  026210  001402                          BEQ     34$
  2918  026212  000137  025570                  JMP     35$
  2919  026216                          34$:
  2920
  2921  026216                                  ENDSEG                          ;%%END OF SEGMENT%%
   (3)  026216                          10000$:
   (3)  026216  104405                          TRAP    C$ESEG
  2922  026220                          ENDTST                                  ;**END OF TEST**
   (3)  026220                          L10066:
   (3)  026220  104401                          TRAP    C$ETST
  2923
  2924                                  .SBTTL  **TEST 29** - CHECK SECTOR BITS OF HEADER COMPARE
  2925
  2926  026222                          BGNTST                                  ;**START OF TEST**
  2927
  2928
  2929  026222                          STARS
   (2)                                  ;;*****************************************************************
  2930                                  ;TEST THAT ALL SECTOR BITS OF HEADER WORD CAN COMPARE
  2931                                  ;UNIQUELY.  WE TESTED THE HEADER COMPARE LOGIC EARLIER
  2932                                  ;BUT THAT WAS NOT AN EXTENSIVE TEST OF THE SECTOR BITS.
  2933                                  ;THE TEST PROCEDURE IS TO WRITE EACH SECTOR OF TRACK
  2934                                  ;0 WITH THE SECTOR ADDRESS, THEN GO BACK AND READ
  2935                                  ;EACH SECTOR.  IF ANY SECTOR HAS ANY DATA THEN THAT
  2936                                  ;WHICH WAS EXPECTED THEN WE HAVE AN ERROR
  2937                                  ;ERROR PRINT OUT WILL GIVE SECTOR, EXPECTED AND RECEIVED
  2938  026222                          STARS
   (2)                                  ;;*****************************************************************
  2939
  2940
  2941  026222  004737  015766                  JSR     PC,HDHOME       ;HEADS OVER TRACK 0
  2942  026226                                  CKERFG                  ;HEADS GO HOME OKAY
   (4)  026234  104432                          TRAP    C$EXIT
   (4)  026236  000414                          .WORD   L10067-.
  2943
  2944  026240                                  BGNSEG                          ;%%START OF SEGMENT%%
   (3)  026240  104404                          TRAP    C$BSEG
```

```

     026242  005037  002272          1$:     CLR     TMP0            ;CLEAR

     026246                                  BGNSEG                          ;%%START OF SEGMENT%%
(3)  026246  104404                          TRAP    C$BSEG

     C26250  012702  003426          199$:   MOV     #BUF,R2         ;WRITE A PATTERN FOR THE WRITE
     026254  012701  000200                  MOV     #128.,R1        ;ONE SECTOR'S WORTH
     026260  013722  002272          2$:     MOV     TMP0,(R2)+      ;WRITE IT
     026264  005301                          DEC     R1              ;DONE,
     026266  001374                          BNE     2$              ;IF NOT, GO BACK

     026270  012777  177600  154064          MOV     #-128.,@RLMP    ;ONE SECTOR WORD COUNT
     026276  012777  003426  154052          MOV     #BUF,@RLBA      ;WRITE FROM BUF
     026304  013777  002272  154046          MOV     TMP0,@RLDA      ;SECTOR
     026312  004537  015056                  JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
     026316  000012                          WRITE
     026320  004537  015702                  JSR     R5,WTCRDY       ;WAIT FOR WRITE TO FINISH
     026324                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3)  026324  104410                          TRAP    C$ESCAPE
(3)  026326  000320                          .WORD   10001$-.
     026330  005237  002272                  INC     TMP0            ;NEXT SECTOR
     026334  023727  002272  000050          CMP     TMP0,#40.       ;ALL DONE?
     026342  001342                          BNE     199$            ;NO GO BACK
     026344  005037  002272                  CLR     TMP0            ;CLEAR

     026350                                  BGNSEG                          ;%%START OF SEGMENT%%
(3)  026350  104404                          TRAP    C$BSEG

     026352  012702  003426          98$:    MOV     #BUF,R2         ;CLEAR THE BUFFER FIRST
     026356  012701  000200                  MOV     #128.,R1        ;128 WORDS
     026362  005022                  3$:     CLR     (R2)+
     026364  005301                          DEC     R1
     026366  001375                          BNE     3$

     026370  013777  002272  153762          MOV     TMP0,@RLDA      ;GET SECTOR
     026376  012777  003426  153752          MOV     #BUF,@RLBA      ;SETUP BUS ADDRESS

     026404  012777  177600  153750          MOV     #-128.,@RLMP    ;READ A SECTOR
     026412  004537  015056                  JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
     026416  000014                          READ
     026420  004537  015702                  JSR     R5,WTCRDY
     026424                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3)  026424  104410                          TRAP    C$ESCAPE
(3)  026426  000216                          .WORD   10002$-.

     026430  004537  014614                  JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
     026434  005737  002236                  TST     T.CRC           ;WAS ERROR A DCK??
     026440  001003                          BNE     8$              ;YES,SEE IF WE A DUMP
     026442                          10$:    ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3)  026442  104410                          TRAP    C$ESCAPE
(3)  026444  000200                          .WORD   10002$-.
     026446  000404                          BR      99$             ;SKIP AROUND
     026450  005737  012440          8$:     TST     T.DMP           ;DO WE STILL WANT TO CHECK IT
     026454  001772                          BEQ     10$             ;NO
     026456                                  CKLOOP                  ;YES, CHECK FOR LOOP FIRST
```

```
  (3)  026456  104406                               TRAP    C$CLP1
 2993
 2994                                      ;CHECK NOW TO SEE IF WE READ THE RIGHT SECTOR
 2995
 2996  026460  005037  002242              99$:     CLR     CDCNT                   ;CLEAR NUMBER WE'RE TO PRINT
 2997  026464  005037  002234                       CLR     CHECK                   ;ALLOW HEADER ON FIRST PRINT
 2998  026470  013737  002272  002300               MOV     TMPO,GDDAT              ;EXPECTED DATA
 2999  026476  012702  003426                       MOV     #BUF,R2                 ;BUFFER
 3000  026502  012701  000200                       MOV     #128.,R1                ;WORD COUNT
 3001  026506  012237  002302              5$:      MOV     (R2)+,BDDAT             ;
 3002  026512  023737  002302  002300               CMP     BDDAT,GDDAT
 3003  026520  001440                               BEQ     6$
 3004
 3005  026522  023737  002242  012442               CMP     CDCNT,T.LMT                     ;CHECKED ENOUGH??
 3006  026530  001002                               BNE     333$                    ;NO
 3007  026532                                       ESCAPE  SEG                     ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  026532  104410                               TRAP    C$ESCAPE
  (3)  026534  000110                               .WORD   10002$-.
 3008  026536  005237  002242              333$:    INC     CDCNT                   ;ACCOUNT FOR IT
 3009
 3010  026542  005737  002234                       TST     CHECK                   ;HEADER OR JUST DATA
 3011  026546  001007                               BNE     9$                      ;JUST DATA
 3012  026550                                       ERRDF   38.,EM50,ERR11          ;
  (4)  026550  104455                               TRAP    C$ERDF
  (5)  026552  000046                               .WORD   38
  (5)  026554  006621                               .WORD   EM50
  (5)  026556  010220                               .WORD   ERR11
 3013  026560  005237  002234                       INC     CHECK                   ;ACCOUNT FOR PRINT OF HEADER
 3014  026564  000416                               BR      6$
 3015
 3016  026566                              9$:      PRINTB #FRMT8,TMPO,GDDAT,BDDAT
 (10)  026566  013746  002302                       MOV     BDDAT,-(SP)
  (9)  026572  013746  002300                       MOV     GDDAT,-(SP)
  (8)  026576  013746  002272                       MOV     TMPO,-(SP)
  (7)  026602  012746  011426                       MOV     #FRMT8,-(SP)
  (6)  026606  012746  000004                       MOV     #4,-(SP)
  (3)  026612  010600                               MOV     SP,R0
  (4)  026614  104414                               TRAP    C$PNTB
  (4)  026616  062706  000012                       ADD     #12,SP
 3017  026622                              6$:      CKLOOP
  (3)  026622  104406                               TRAP    C$CLP1
 3018
 3019  026624  005301                               DEC     R1                      ;ALL OF SECTOR CHECKED?
 3020  026626  001327                               BNE     5$                      ;GO BACK IF NOT
 3021  026630  005237  002272                       INC     TMPO                    ;NEXT SECTOR
 3022  026634  023727  002272  000050               CMP     TMPO,#40.               ;DONE?
 3023  026642  001243                               BNE     98$                     ;NO, GO BACK
 3024
 3025  026644                                       ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  026644                              10002$:
  (3)  026644  104405                               TRAP    C$ESEG
 3026
 3027  026646                                       ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  026646                              10001$:
  (3)  026646  104405                               TRAP    C$ESEG
 3028  026650                                       ENDSEG                                  ;%%END OF SEGMENT%%
 (3) 026650                          10000$:
 (3) 026650 104405                           TRAP    C$ESEG
     026652                          ENDTST                                  ;**END OF TEST**
 (3) 026652                          L10067:
 (3) 026652 104401                           TRAP    C$ETST

                                     .SBTTL  **TEST 30** - WRITE CHECK NPR INTEGRITY

     026654                          BGNTST                                  ;**START OF TEST**

     026654                          STARS
 (2)                                 ;;****************************************************************
                                     ;CHECK THAT NPR WILL NOT INTERFERE WITH THE OPERATION OF THE
                                     ;UNIBUS. WE SET UP LOCATION 4 TO HANDLE THE TRAP IF IT HAPPENS.
     026654                          STARS
 (2)                                 ;;****************************************************************


     026654 004737 015766                    JSR     PC,HDHOME       ;HEADS OVER TRACK 0
     026660                                  CKERFG                  ;HEADS GO HOME OKAY
 (4) 026666 104432                           TRAP    C$EXIT
 (4) 026670 000376                           .WORD   L10070-.

     026672                                  BGNSEG                          ;%%START OF SEGMENT%%
 (3) 026672 104404                           TRAP    C$BSEG

     026674 012700 003426                    MOV     #BUF,R0         ;SETUP AND WRITE
     026700 012701 000200                    MOV     #128.,R1        ;128 WORDS
     026704 012720 125252            299$:   MOV     #125252,(R0)+   ;WRITE
     026710 005301                           DEC     R1              ;DONE??
     026712 001374                           BNE     299$

     026714 012777 003426 153434             MOV     #BUF,@RLBA      ;LOAD BUS ADDRESS
     026722 012777 177600 153432             MOV     #-128.,@RLMP    ;WORD COUNT
     026730 005077 153424                    CLR     @RLDA           ;CLEAR DISK ADDRESS
     026734 004537 015056                    JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
     026740 000012                           WRITE
     026742 004537 015702                    JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
     026746                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3) 026746 104410                           TRAP    C$ESCAPE
 (3) 026750 000314                           .WORD   10000$-.
     026752 004537 014614                    JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
     026756                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3) 026756 104410                           TRAP    C$ESCAPE
 (3) 026760 000304                           .WORD   10000$-.


                                     ;VERIFY WRITE WITH READ BEFORE WRCHK

     026762 005077 153372                    CLR     @RLDA
     026766 012777 003426 153362             MOV     #BUF,@RLBA
     026774 012777 177600 153360             MOV     #-128.,@RLMP
     027002 004537 015056                    JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
     027006 000014                           READ
     027010 004537 015702                    JSR     R5,WTCRDY
     027014                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
```

```
   (3)  027014  104410                            TRAP    C$ESCAPE
   (3)  027016  000246                            .WORD   10000$-.
  3072  027020  004537  014614                    JSR     R5,CHERR                      ;CHECK CNTLR FOR ERRORS
  3073  027024                                    ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  027024  104410                            TRAP    C$ESCAPE
   (3)  027026  000236                            .WORD   10000$-.
  3074
  3075  027030                                    BGNSEG                                ;%%START OF SEGMENT%%
   (3)  027030  104404                            TRAP    C$BSEG
  3076
  3077  027032                            1$:     SETVEC  ERRVEC,#TRPHAN,#340           ;SET UP FOR TRAP
   (7)  027032  012746  000340                    MOV     #340,-(SP)
   (6)  027036  012746  015760                    MOV     #TRPHAN,-(SP)
   (5)  027042  013746  002244                    MOV     ERRVEC,-(SP)
   (4)  027046  012746  000003                    MOV     #3,-(SP)
   (3)  027052  104437                            TRAP    C$SVEC
   (2)  027054  062706  000010                    ADD     #10,SP
  3078  027060  005037  002254                    CLR     TRPFLG                        ;CLEAR TRAP OCCURANCE
  3079  027064  012777  003426  153264            MOV     #BUF,@RLBA                    ;BUS ADDRESS
  3080  027072  005077  153262                    CLR     @RLDA                         ;LOAD DISK ADDRESS
  3081  027076  012777  177600  153256            MOV     #-128.,@RLMP                  ;WORD COUNT OF 128
  3082  027104  005037  002300                    CLR     GDDAT                         ;SET UP CSR TO LOAD
  3083  027110  013737  002246  002300            MOV     DRIVE,GDDAT                   ;SET IN DRIVE
  3084  027116  052737  000002  002300            BIS     #WRCHK,GDDAT                  ;SET IN FUNCTION
  3085  027124  004537  015364                    JSR     R5,BEFORE                     ;LOAD FOR ERROR PRINTOUT
  3086  027130  013737  002300  002330            MOV     GDDAT,B.CS                    ;SET IN COMMAND
  3087  027136  052737  000201  002330            BIS     #201,B.CS                     ;LOAD CRDY
  3088  027144  042737  002000  002330            BIC     #OPI,B.CS                     ;CLEAR (BIT 10)
  3089  027152  013777  002300  153174            MOV     GDDAT,@RLCS                   ;ISSUE WRITE CHECK
  3090  027160  012701  000144                    MOV     #100.,R1                      ;WAIT FOR CRDY
  3091  027164  032777  000200  153162    5$:     BIT     #CRDY,@RLCS                   ;NPR DONE
  3092  027172  001015                            BNE     6$                            ;YES, 6$
  3093  027174                                    WAITUS  #20.                          ;WAIT A WHILE
  3094  027206  005301                            DEC     R1                            ;A WHILE UP
  3095  027210  001365                            BNE     5$                            ;NO, GO BACK
  3096
  3097  027212  004537  015416                    JSR     R5,AFTER
  3098  027216                                    ERRDF   0.,CRTIM,ERR5                 ;CONTROLLER TIMED OUT
   (4)  027216  104455                            TRAP    C$ERDF
   (5)  027220  000000                            .WORD   0
   (5)  027222  003521                            .WORD   CRTIM
   (5)  027224  007722                            .WORD   ERR5
  3099  027226                            6$:     CLRVEC  ERRVEC                        ;CLEAR VECTOR
   (3)  027226  013700  002244                    MOV     ERRVEC,R0
   (3)  027232  104436                            TRAP    C$CVEC
  3100  027234                                    ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  027234  104410                            TRAP    C$ESCAPE
   (3)  027236  000024                            .WORD   10001$-.
  3101
  3102  027240  005737  002254                    TST     TRPFLG                        ;DID TRAP OCCUR?
  3103  027244  001406                            BEQ     7$                            ;NO
  3104  027246  004537  015416                    JSR     R5,AFTER
  3105  027252                                    ERRSF   1.,EM57,ERR0                  ;TRAP ON WRITE
   (4)  027252  104454                            TRAP    C$ERSF
   (5)  027254  000001                            .WORD   1
   (5)  027256  007052                            .WORD   EM57
  (5)  027260  007510                              .WORD   ERRO
 3106  027262                            7$:
 3107
 3108
 3109  027262                                      ENDSEG                          ;%%END OF SEGMENT%%
  (3)  027262                            10001$:
  (3)  027262  104405                              TRAP    C$ESEG
 3110  027264                                      ENDSEG                          ;%%END OF SEGMENT%%
  (3)  027264                            10000$:
  (3)  027264  104405                              TRAP    C$ESEG
 3111
 3112  027266                            ENDTST                                    ;**END OF TEST**
  (3)  027266                            L10070:
  (3)  027266  104401                              TRAP    C$ETST
 3113
 3114                                    .SBTTL  **TEST 31** - WRITE CHECK FUNCTION
 3115
 3116  027270                            BGNTST                                    ;**START OF TEST**
 3117
 3118  027270                            STARS
  (2)                                    ;;*****************************************************************
 3119                                    ;CHECK OF WRITE CHECK LOGIC UNDER FLAG MODE
 3120                                    ; WE WILL WRITE CHECK A FULL SECTOR (128 WORDS) FROM
 3121                                    ;MEMORY (BUF).  WE CHECK THAT NO ERRORS OCCUR.
 3122  027270                            STARS
  (2)                                    ;;*****************************************************************
 3123
 3124
 3125  027270  004737  015766                      JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 3126  027274                                      CKERFG                  ;HEADS GO HOME OKAY
  (4)  027302  104432                              TRAP    C$EXIT
  (4)  027304  000214                              .WORD   L10071-.
 3127
 3128  027306                                      BGNSEG                          ;%%START OF SEGMENT%%
  (3)  027306  104404                              TRAP    C$BSEG
 3129
 3130  027310  012700  003426                      MOV     #BUF,R0         ;SETUP AND WRITE
 3131  027314  012701  000200                      MOV     #128.,R1        ;128 WORDS
 3132  027320  012720  125252            299$:     MOV     #125252,(R0)+   ;WRITE
 3133  027324  005301                              DEC     R1              ;DONE??
 3134  027326  001374                              BNE     299$
 3135
 3136  027330  012777  003426  153020              MOV     #BUF,@RLBA      ;LOAD BUS ADDRESS
 3137  027336  012777  177600  153016              MOV     #-128.,@RLMP    ;WORD COUNT
 3138  027344  005077  153010                      CLR     @RLDA           ;CLEAR DISK ADDRESS
 3139  027350  004537  015056                      JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
 3140  027354  000012                              WRITE
 3141  027356  004537  015702                      JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
 3142  027362                                      ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  027362  104410                              TRAP    C$ESCAPE
  (3)  027364  000132                              .WORD   10000$-.
 3143  027366  004537  014614                      JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
 3144  027372                                      ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  027372  104410                              TRAP    C$ESCAPE
  (3)  027374  000122                              .WORD   10000$-.
 3145  027376                                      BGNSEG                          ;%%START OF SEGMENT%%
```

```
  (3)  027376  104404                                 TRAP    C$BSEG
 3146
 3147                                         ;VERIFY WRITE WITH READ BEFORE WRCHK
 3148
 3149  027400  005077  152754                         CLR     @RLDA
 3150  027404  012777  003426  152744                 MOV     #BUF,@RLBA
 3151  027412  012777  177600  152742                 MOV     #-128.,@RLMP
 3152  027420  004537  015056                         JSR     R5,LDFUNC                 ;LOAD THE FUNCTION IN NEXT WORD
 3153  027424  000014                                 READ
 3154  027426  004537  015702                         JSR     R5,WTCRDY
 3155  027432                                         ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  027432  104410                                 TRAP    C$ESCAPE
  (3)  027434  000060                                 .WORD   10001$-.
 3156  027436  004537  014614                         JSR     R5,CHERR                  ;CHECK CNTLR FOR ERRORS
 3157  027442                                         ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  027442  104410                                 TRAP    C$ESCAPE
  (3)  027444  000050                                 .WORD   10001$-.
 3158
 3159  027446                                         BGNSEG                            ;%%START OF SEGMENT%%
  (3)  027446  104404                                 TRAP    C$BSEG
 3160
 3161  027450                                 3$:
 3162  027450  005077  152704                         CLR     @RLDA
 3163  027454  012777  177600  152700                 MOV     #-128.,@RLMP    ;WORD COUNT
 3164  027462  012777  003426  152666                 MOV     #BUF,@RLBA      ;BUS ADDRESS
 3165  027470  004537  015056                         JSR     R5,LDFUNC                 ;LOAD THE FUNCTION IN NEXT WORD
 3166  027474  000002                                 WRCHK                   ;WRITE CHECK
 3167
 3168  027476  004537  015702                         JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
 3169  027502                                         ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  027502  104410                                 TRAP    C$ESCAPE
  (3)  027504  000006                                 .WORD   10002$-.
 3170
 3171
 3172  027506  004537  014614                         JSR     R5,CHERR                  ;CHECK CNTLR FOR ERRORS
 3173
 3174  027512                                         ENDSEG                            ;%%END OF SEGMENT%%
  (3)  027512                                 10002$:
  (3)  027512  104405                                 TRAP    C$ESEG
 3175  027514                                         ENDSEG                            ;%%END OF SEGMENT%%
  (3)  027514                                 10001$:
  (3)  027514  104405                                 TRAP    C$ESEG
 3176  027516                                         ENDSEG                            ;%%END OF SEGMENT%%
  (3)  027516                                 10000$:
  (3)  027516  104405                                 TRAP    C$ESEG
 3177  027520                                 ENDTST                                    ;**END OF TEST**
  (3)  027520                                 L10071:
  (3)  027520  104401                                 TRAP    C$ETST
 3178
 3179                                         .SBTTL  **TEST 32** - WRITE CHECK FUNCTION INTERRUPT
 3180
 3181  027522                                 BGNTST                                    ;**START OF TEST**
 3182
 3183  027522                                 STARS
  (2)                                         ;;*******************************************************************
 3184                                         ;CHECK OF WRITE CHECK LOGIC UNDER INTERRUPT MODE
```

```
                                        ;WE WILL WRITE CHECK A FULL SECTOR (128 WORDS) FROM MEMORY (BUF).
                                        ;WE CHECK THAT NO ERRORS OCCUR.  WE DO NOT CHECK RLDA OR RLBA
                                        ;INCREMENT AT THIS TIME.
      027522                            STARS
 (2)                                    ;;*************************************************************


      027522  004737  015766                    JSR     PC,HDHOME       ;HEADS OVER TRACK 0
      027526                                    CKERFG                  ;HEADS GO HOME OKAY
 (4)  027534  104432                            TRAP    C$EXIT
 (4)  027536  000252                            .WORD   L10072-.

      027540                                    BGNSEG                          ;%%START OF SEGMENT%%
 (3)  027540  104404                            TRAP    C$BSEG

      027542  012700  003426                    MOV     #BUF,R0         ;SETUP AND WRITE
      027546  012701  000200                    MOV     #128.,R1        ;128 WORDS
      027552  012720  125252            299$:   MOV     #125252,(R0)+   ;WRITE
      027556  005301                            DEC     R1              ;DONE??
      027560  001374                            BNE     299$

      027562  012777  003426  152566            MOV     #BUF,@RLBA      ;LOAD BUS ADDRESS
      027570  012777  177600  152564            MOV     #-128.,@RLMP    ;WORD COUNT
      027576  005077  152556                    CLR     @RLDA           ;CLEAR DISK ADDRESS
      027602  004537  015056                    JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
      027606  000012                            WRITE
      027610  004537  015702                    JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
      027614                                    ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  027614  104410                            TRAP    C$ESCAPE
 (3)  027616  000170                            .WORD   10000$-.
      027620  004537  014614                    JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
      027624                                    ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  027624  104410                            TRAP    C$ESCAPE
 (3)  027626  000160                            .WORD   10000$-.
                                        ;VERIFY WRITE WITH READ BEFORE WRCHK

      027630  005077  152524                    CLR     @RLDA
      027634  012777  003426  152514            MOV     #BUF,@RLBA
      027642  012777  177600  152512            MOV     #-128.,@RLMP
      027650  004537  015056                    JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
      027654  000014                            READ
      027656  004537  015702                    JSR     R5,WTCRDY
      027662                                    ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  027662  104410                            TRAP    C$ESCAPE
 (3)  027664  000122                            .WORD   10000$-.
      027666  004537  014614                    JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
      027672                                    ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  027672  104410                            TRAP    C$ESCAPE
 (3)  027674  000112                            .WORD   10000$-.

      027676                                    BGNSEG                          ;%%START OF SEGMENT%%
 (3)  027676  104404                            TRAP    C$BSEG


      027700  005037  002256                    CLR     INTFLG          ;CLEAR INTERRUPT OCCURANCE FLAG
      027704  005077  152450                    CLR     @RLDA
```

```
     027710 012777 177600 152444            MOV     #-128.,@RLMP      ;SET UP WORD COUNT
     027716 012777 003426 152432            MOV     #BUF,@RLBA        ;SET UP BUS ADDRESS

     027724                                 SETPRI  #PRI00            ;PRIORITY TO 0
 (3) 027724 012700 000000                   MOV     #PRI00,R0
 (3) 027730 104441                          TRAP    C$SPRI
     027732 004537 015056                   JSR     R5,LDFUNC                  ;LOAD THE FUNCTION IN NEXT WORD
     027736 000102                          WRCHK!INTEN               ;WRITE CHECK UNDER INTERRUPT
     027740 004537 015702                   JSR     R5,WTCRDY         ;WAIT FOR INTERRUPT
     027744                                 ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3) 027744 104410                          TRAP    C$ESCAPE
 (3) 027746 000036                          .WORD   10001$-.

     027750                                 SETPRI  #PRI07            ;SET PRIORITY TO 7
 (3) 027750 012700 000340                   MOV     #PRI07,R0
 (3) 027754 104441                          TRAP    C$SPRI
     027756 005737 002256                   TST     INTFLG            ;DID INTERRUPT OCCUR?
     027762 001004                          BNE     2$                ;YES-BRANCH NO-REPORT

     027764                                 ERRDF   4.,EM60,ERR0      ;WRITE DID NOT INTERRUPT
 (4) 027764 104455                          TRAP    C$ERDF
 (5) 027766 000004                          .WORD   4
 (5) 027770 007107                          .WORD   EM60
 (5) 027772 007510                          .WORD   ERR0
     027774                         2$:     ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3) 027774 104410                          TRAP    C$ESCAPE
 (3) 027776 000006                          .WORD   10001$-.

     030000 004537 014614                   JSR     R5,CHERR                   ;CHECK CNTLR FOR ERRORS

     030004                                 ENDSEG                             ;%%END OF SEGMENT%%
 (3) 030004                         10001$:
 (3) 030004 104405                          TRAP    C$ESEG
     030006                                 ENDSEG                             ;%%END OF SEGMENT%%
 (3) 030006                         10000$:
 (3) 030006 104405                          TRAP    C$ESEG
     030010                         ENDTST                                     ;**END OF TEST**
 (3) 030010                         L10072:
 (3) 030010 104401                          TRAP    C$ETST

                                    .SBTTL  **TEST 33** - PROPER INCREMENT OF RLBA ON WRITE CHECK

     030012                         BGNTST                                     ;**START OF TEST**


     030012                         STARS
 (2)                                ;;*******************************************************************
                                    ;CHECK THAT THE RLBA WILL INCREMENT PROPERLY AFTER THE
                                    ;WRITE CHECK WAS FINISHED THE RLBA SHOULD BE 128 WORDS (256 BYTES)
                                    ;CREATER.  STARTING RLBA IS 'BUF'', ENDING SHOULD BE 'BUF + 256.''
                                    ;WE WILL MONITOR ALL ERRORS AND REPORT THEM ACCORDINGLY
     030012                         STARS
 (2)                                ;;*******************************************************************


     030012 004737 015766                   JSR     PC,HDHOME         ;HEADS OVER TRACK 0
```

```
3264  030016                                  CKERFG                      ;HEADS GO HOME OKAY
 (4)  030024  104432                          TRAP    C$EXIT
 (4)  030026  000256                          .WORD   L10073-.
3265
3266  030030                                  BGNSEG                                ;%%START OF SEGMENT%%
 (3)  030030  104404                          TRAP    C$BSEG
3267
3268  030032  012700  003426                  MOV     #BUF,R0             ;SETUP AND WRITE
3269  030036  012701  000200                  MOV     #128.,R1            ;128 WORDS
3270  030042  012720  125252         299$:    MOV     #125252,(R0)+       ;WRITE
3271  030046  005301                          DEC     R1                  ;DONE??
3272  030050  001374                          BNE     299$
3273
3274  030052  012777  003426  152276          MOV     #BUF,@RLBA          ;LOAD BUS ADDRESS
3275  030060  012777  177600  152274          MOV     #-128.,@RLMP        ;WORD COUNT
3276  030066  005077  152266                  CLR     @RLDA               ;CLEAR DISK ADDRESS
3277  030072  004537  015056                  JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
3278  030076  000012                          WRITE
3279  030100  004537  015702                  JSR     R5,WTCRDY           ;WAIT FOR CONTROLLER READY
3280  030104                                  ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  C30104  104410                          TRAP    C$ESCAPE
 (3)  030106  000174                          .WORD   10000$-.
3281  030110  004537  014614                  JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
3282  030114                                  ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  030114  104410                          TRAP    C$ESCAPE
 (3)  030116  000164                          .WORD   10000$-.
3283                                 ;VERIFY WRITE WITH READ BEFORE WRCHK
3284
3285  030120  005077  152234                  CLR     @RLDA
3286  030124  012777  003426  152224          MOV     #BUF,@RLBA
3287  030132  012777  177600  152222          MOV     #-128.,@RLMP
3288  030140  004537  015056                  JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
3289  030144  000014                          READ
3290  030146  004537  015702                  JSR     R5,WTCRDY
3291  030152                                  ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  030152  104410                          TRAP    C$ESCAPE
 (3)  030154  000126                          .WORD   10000$-.
3292  030156  004537  014614                  JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
3293  030162                                  ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  030162  104410                          TRAP    C$ESCAPE
 (3)  030164  000116                          .WORD   10000$-.
3294
3295  030166                                  BGNSEG                                ;%%START OF SEGMENT%%
 (3)  030166  104404                          TRAP    C$BSEG
3296
3297  030170                         3$:
3298  030170  005077  152164                  CLR     @RLDA
3299  030174  012777  003426  152154          MOV     #BUF,@RLBA          ;SET UP BUS ADDRESS
3300  030202  012777  177600  152152          MOV     #-128.,@RLMP        ;WORD COUNT
3301  030210  012737  003426  002300          MOV     #BUF,GDDAT          ;FORM EXPECTED BUS ADDRESS
3302  030216  062737  000400  002300          ADD     #256.,GDDAT         ;AFTER WRITE
3303
3304  030224  004537  015056                  JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
3305  030230  000002                          WRCHK                       ;WRITE CHECK
3306  030232  004537  015702                  JSR     R5,WTCRDY           ;WAIT FOR CONTROLLER READY
3307  030236                                  ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
```

```
  (3)  030236  104410                               TRAP    C$ESCAPE
  (3)  030240  000040                               .WORD   10001$-.
 3308
 3309  030242  004537  014614                       JSR     R5,CHERR                  ;CHECK CNTLR FOR ERRORS
 3310  030246                                       ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  030246  104410                               TRAP    C$ESCAPE
  (3)  030250  000030                               .WORD   10001$-.
 3311  030252  017737  152100  002302               MOV     @RLBA,BDDAT     ;READ 'RLBA' FOR PRESENT ADDRESS
 3312  030260  023737  002302  002300               CMP     BDDAT,GDDAT     ;DID 'BA' INCREMENT PROPERLY?
 3313  030266  001404                               BEQ     2$              ;YES, CONTINUE
 3314
 3315  030270                                       ERRDF   5.,EM61,ERR4    ;BA DID NOT INCREMENT
  (4)  030270  104455                               TRAP    C$ERDF
  (5)  030272  000005                               .WORD   5
  (5)  030274  007137                               .WORD   EM61
  (5)  030276· 007654                               .WORD   ERR4
 3316
 3317  030300                               2$:
 3318
 3319  030300                                       ENDSEG                            ;%%END OF SEGMENT%%
  (3)  030300                               10001$:
  (3)  030300  104405                               TRAP    C$ESEG
 3320  030302                                       ENDSEG                            ;%%END OF SEGMENT%%
  (3)  030302                               10000$:
  (3)  030302  104405                               TRAP    C$ESEG
 3321  030304                               ENDTST                                    ;**END OF TEST**
  (3)  030304                               L10073:
  (3)  030304  104401                               TRAP    C$ETST
 3322
 3323                                       .SBTTL  **TEST 34** - PROPER INCREMENT OF RLDA ON WRITE CHECK
 3324
 3325  030306                               BGNTST                                    ;**START OF TEST**
 3326
 3327  030306                               STARS
  (2)                                       ;;*********************************************************************
 3328                                       ;CHECK THAT THE SECTOR INCREMENTS AFTER THE WRITE CHECK WAS FINISHED.
 3329                                       ;A FULL SECTOR WRITE CHECK THE RLDA SHOULD REFLECT AN INCREMENT
 3330                                       ;OF THE SECOTR.  ''GDDAT'' WAS THE EXPECTED RLDA.
 3331  030306                               STARS
  (2)                                       ;;*********************************************************************
 3332
 3333
 3334  030306  004737  015766                       JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 3335  030312                                       CKERFG                  ;HEADS GO HOME OKAY
  (4)  030320  104432                               TRAP    C$EXIT
  (4)  030322  000254                               .WORD   L10074-.
 3336
 3337  030324                                       BGNSEG                            ;%%START OF SEGMENT%%
  (3)  030324  104404                               TRAP    C$BSEG
 3338
 3339  030326  012700  003426                       MOV     #BUF,R0         ;SETUP AND WRITE
 3340  030332  012701  000200                       MOV     #128.,R1        ;128 WORDS
 3341  030336  012720  125252               299$:   MOV     #125252,(R0)+   ;WRITE
 3342  030342  005301                               DEC     R1              ;DONE??
 3343  030344  001374                               BNE     299$
 3344
```

```
  3345  030346  012777  003426  152002                 MOV     #BUF,@RLBA        ;LOAD BUS ADDRESS
  3346  030354  012777  177600  152000                 MOV     #-128.,@RLMP      ;WORD COUNT
  3347  030362  005077  151772                         CLR     @RLDA             ;CLEAR DISK ADDRESS
  3348  030366  004537  015056                         JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
  3349  030372  000012                                 WRITE
  3350  030374  004537  015702                         JSR     R5,WTCRDY         ;WAIT FOR CONTROLLER READY
  3351  030400                                         ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  030400  104410                                 TRAP    C$ESCAPE
   (3)  030402  000172                                 .WORD   10000$-.
  3352  030404  004537  014614                         JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
  3353  030410                                         ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  030410  104410                                 TRAP    C$ESCAPE
   (3)  030412  000162                                 .WORD   10000$-.
  3354                                         ;VERIFY WRITE WITH READ BEFORE WRCHK
  3355
  3356  030414  005077  151740                         CLR     @RLDA
  3357  030420  012777  003426  151730                 MOV     #BUF,@RLBA
  3358  030426  012777  177600  151726                 MOV     #-128.,@RLMP
  3359  030434  004537  015056                         JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
  3360  030440  000014                                 READ
  3361  030442  004537  015702                         JSR     R5,WTCRDY
  3362  030446                                         ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  030446  104410                                 TRAP    C$ESCAPE
   (3)  030450  000124                                 .WORD   10000$-.
  3363  030452  004537  014614                         JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
  3364  030456                                         ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  030456  104410                                 TRAP    C$ESCAPE
   (3)  030460  000114                                 .WORD   10000$-.
  3365
  3366  030462                                         BGNSEG                              ;%%START OF SEGMENT%%
   (3)  030462  104404                                 TRAP    C$BSEG
  3367
  3368  030464                                 3$:
  3369  030464  005037  002300                         CLR     GDDAT
  3370  030470  013777  002300  151662                 MOV     GDDAT,@RLDA       ;SETUP DISK ADDRESS
  3371  030476  005237  002300                         INC     GDDAT             ;CREATE EXPECTED SECTOR
  3372  030502  012777  177600  151652                 MOV     #-128.,@RLMP      ;WORD COUNT
  3373  030510  012777  003426  151640                 MOV     #BUF,@RLBA        ;SETUP BUS ADDRESS
  3374
  3375  030516  004537  015056                         JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
  3376  030522  000002                                 WRCHK                     ;WRITE CHECK
  3377  030524  004537  015702                         JSR     R5,WTCRDY         ;WAIT FOR CONTROLLER READY
  3378  030530                                         ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  030530  104410                                 TRAP    C$ESCAPE
   (3)  030532  000040                                 .WORD   10001$-.
  3379
  3380  030534  004537  014614                         JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
  3381  030540                                         ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  030540  104410                                 TRAP    C$ESCAPE
   (3)  030542  000030                                 .WORD   10001$-.
  3382
  3383  030544  013737  002344  002302                 MOV     E.DA,BDDAT        ;READ DISK ADDRESS
  3384  030552  023737  002300  002302                 CMP     GDDAT,BDDAT       ;DID SECTOR INCREMENT PROPERLY
  3385  030560  001404                                 BEQ     2$                ;YES, BRANCH  NO, REPORT ERROR
  3386
  3387  030562                                         ERRDF   6.,EM62,ERR4      ;DA DID NOT INCREMENT
  (4)  030562  104455                                TRAP    C$ERDF
  (5)  030564  000006                                .WORD   6
  (5)  030566  007207                                .WORD   EM62
  (5)  030570  007654                                .WORD   ERR4
 3388
 3389  030572                              2$:
 3390
 3391  030572                                        ENDSEG                          ;%%END OF SEGMENT%%
  (3)  030572                              10001$:
  (3)  030572  104405                                TRAP    C$ESEG
 3392  030574                                        ENDSEG                          ;%%END OF SEGMENT%%
  (3)  030574                              10000$:
  (3)  030574  104405                                TRAP    C$ESEG
 3393  030576                              ENDTST                                    ;**END OF TEST**
  (3)  030576                              L10074:
  (3)  030576  104401                                TRAP    C$ETST
 3394
 3395
 3396                                      .SBTTL  **TEST 35** - MULTIPLE SECTOR WRITE CHECK
 3397
 3398  030600                              BGNTST                                    ;**START OF TEST**
 3399
 3400  030600                              STARS
  (2)                                      ;;*******************************************************************
 3401                                      ;CHECK FOR MULTIPLE SECTOR WRITE CHECK. THIS TEST CHECKS
 3402                                      ;THAT TWO SECTORS CAN BE SUCCESSFULLY CHECKED.  WE LOAD
 3403                                      ;A WORD COUNT OF 129 WORDS (ONE SECTOR + 1 WORD) STARTING AT
 3404                                      ;SECTOR 0 THRU SECTOR 37 AND VERIFY THAT THE RLDA DOES
 3405                                      ;A DOUBLE INCREMENT EACH TIME.
 3406  030600                              STARS
  (2)                                      ;;*******************************************************************
 3407
 3408
 3409
 3410  030600  004737  015766                        JSR     PC,HDHOME       ;HEADS OVER TRACK 0
 3411  030604                                        CKERFG                  ;HEADS GO HOME OKAY
  (4)  030612  104432                                TRAP    C$EXIT
  (4)  030614  000354                                .WORD   L10075-.
 3412
 3413  030616                                        BGNSEG                          ;%%START OF SEGMENT%%
  (3)  030616  104404                                TRAP    C$BSEG
 3414
 3415  030620  012737  000000  002272                MOV     #0,TMP0
 3416  030626  012737  000000  002274                MOV     #0,TMP1
 3417  030634  012700  003426                        MOV     #BUF,R0         ;SETUP AND WRITE
 3418  030640  012701  000201                        MOV     #129.,R1        ;129 WORDS
 3419  030644  012720  125252              299$:     MOV     #125252,(R0)+   ;WRITE
 3420  030650  005301                                DEC     R1              ;DONE??
 3421  030652  001374                                BNE     299$
 3422
 3423  030654  012777  003426  151474      1$:       MOV     #BUF,@RLBA      ;LOAD BUS ADDRESS
 3424  030662  012777  177577  151472                MOV     #-129.,@RLMP    ;WORD COUNT
 3425  030670  013737  002274  002300                MOV     TMP1,GDDAT
 3426  030676  053737  002272  002300                BIS     TMP0,GDDAT
 3427  030704  013777  002300  151446                MOV     GDDAT,@RLDA
 3428  030712  004537  015056                        JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
 3429  030716  000012                            WRITE
 3430  030720  004537  015702                    JSR     R5,WTCRDY          ;WAIT FOR CONTROLLER READY
 3431  030724                                    ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  030724  104410                            TRAP    C$ESCAPE
  (3)  030726  000240                            .WORD   10000$-.
 3432  030730  004537  014614                    JSR     R5,CHERR                   ;CHECK CNTLR FOR ERRORS
 3433  030734                                    ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  030734  104410                            TRAP    C$ESCAPE
  (3)  030736  000230                            .WORD   10000$-.
 3434
 3435                                  ;VERIFY WRITE WITH READ BEFORE WRCHK
 3436
 3437  030740  013737  002274  002300            MOV     TMP1,GDDAT
 3438  030746  053737  002272  002300            BIS     TMP0,GDDAT
 3439  030754  013777  002300  151376            MOV     GDDAT,@RLDA
 3440  030762  012777  003426  151366            MOV     #BUF,@RLBA
 3441  030770  012777  177577  151364            MOV     #-129.,@RLMP
 3442  030776  004537  015056                    JSR     R5,LDFUNC                  ;LOAD THE FUNCTION IN NEXT WORD
 3443  031002  000014                            READ
 3444  031004  004537  015702                    JSR     R5,WTCRDY
 3445  031010                                    ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  031010  104410                            TRAP    C$ESCAPE
  (3)  031012  000154                            .WORD   10000$-.
 3446  031014  004537  014614                    JSR     R5,CHERR                   ;CHECK CNTLR FOR ERRORS
 3447  031020                                    ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  031020  104410                            TRAP    C$ESCAPE
  (3)  031022  000144                            .WORD   10000$-.
 3448
 3449  031024                                    BGNSEG                             ;%%START OF SEGMENT%%
  (3)  031024  104404                            TRAP    C$BSEG
 3450
 3451
 3452  031026  013737  002274  002300            MOV     TMP1,GDDAT         ;GET CYLINDER
 3453  031034  053737  002272  002300            BIS     TMP0,GDDAT         ;GET SECTOR
 3454  031042  013777  002300  151310            MOV     GDDAT,@RLDA        ;SET DISK ADDRESS-SECTOR 0
 3455  031050  062737  000002  002300            ADD     #2,GDDAT           ;SET EXPECTED + 2
 3456  031056  012777  003426  151272            MOV     #BUF,@RLBA         ;SET BUS ADDRESS
 3457  031064  012777  177577  151270            MOV     #-129.,@RLMP       ;WORD COUNT-SECTOR+1 WORD
 3458
 3459  031072  004537  015056                    JSR     R5,LDFUNC                  ;LOAD THE FUNCTION IN NEXT WORD
 3460  031076  000002                            WRCHK                      ;WRITE CHECK
 3461  031100  004537  015702                    JSR     R5,WTCRDY          ;WAIT FOR CONTROLLER READY?
 3462  031104                                    ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  031104  104410                            TRAP    C$ESCAPE
  (3)  031106  000042                            .WORD   10001$-.
 3463
 3464  031110  004537  014614                    JSR     R5,CHERR                   ;CHECK CNTLR FOR ERRORS
 3465  031114                                    ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  031114  104410                            TRAP    C$ESCAPE
  (3)  031116  000032                            .WORD   10001$-.
 3466
 3467  031120  013737  002344  002302            MOV     E.DA,BDDAT         ;READ DISK ADDRESS
 3468  031126  023737  002302  002300            CMP     BDDAT,GDDAT        ;IS DISK ADDRESS CORRECT
 3469  031134  001404                            BEQ     2$                 ;YES, BRANCH  NO, REPORT ERROR
 3470
 3471  031136                                    ERRDF   7.,EM63,ERR4       ;DISK ADDRESS NOT CORRECT
 (4)  031136  104455                         TRAP    C$ERDF
 (5)  031140  000007                         .WORD   7
 (5)  031142  007246                         .WORD   EM63
 (5)  031144  007654                         .WORD   ERR4
3472
3473  031146                         2$:     CKLOOP
 (3)  031146  104406                         TRAP    C$CLP1
3474
3475  031150                                 ENDSEG                          ;%%END OF SEGMENT%%
 (3)  031150                         10001$:
 (3)  031150  104405                         TRAP    C$ESEG
3476
3477  031152  005237  002272                 INC     TMP0            ;NEXT SECTOR
3478  031156  022737  000046  002272         CMP     #46,TMP0        ;AT END?
3479  031164  001233                         BNE     1$              ;NO, GO BACK
3480  031166                                 ENDSEG                          ;%%END OF SEGMENT%%
 (3)  031166                         10000$:
 (3)  031166  104405                         TRAP    C$ESEG
3481  031170                         ENDTST                                  ;**END OF TEST**
 (3)  031170                         L10075:
 (3)  031170  104401                         TRAP    C$ETST
3482                                 .SBTTL  **TEST 36** - FORCE DCK WITH WRITE CHECK
3483
3484  031172                         BGNTST                                  ;**START OF TEST**
3485
3486  031172                         STARS
 (2)                                 ;;*****************************************************************
3487                                 ;FORCE A DCK WITH WRITE CHECK. THIS IS DONE BY WRITING
3488                                 ;A SECTOR AND CHANGING A WORD IN MEMORY BEFORE WRITE CHECK
3489                                 ;IS ISSUED..
3490  031172                         STARS
 (2)                                 ;;*****************************************************************
3491
3492  031172  004737  015766                 JSR     PC,HDHOME       ;HEADS OVER TRACK 0
3493  031176                                 CKERFG                  ;HEADS GO HOME OKAY
 (4)  031204  104432                         TRAP    C$EXIT
 (4)  031206  000262                         .WORD   L10076-.
3494
3495  031210                                 BGNSEG                          ;%%START OF SEGMENT%%
 (3)  031210  104404                         TRAP    C$BSEG
3496
3497  031212  012700  003426                 MOV     #BUF,R0         ;SETUP AND WRITE
3498  031216  012701  000200                 MOV     #128.,R1        ;128 WORDS
3499  031222  012720  125252         299$:   MCV     #125252,(R0)+   ;WRITE
3500  031226  005301                         DEC     R1              ;DONE??
3501  031230  001374                         BNE     299$
3502
3503  031232  012777  003426  151116         MOV     #BUF,@RLBA      ;LOAD BUS ADDRESS
3504  031240  012777  177600  151114         MOV     #-128.,@RLMP    ;WORD COUNT
3505  031246  005077  151106                 CLR     @RLDA           ;CLEAR DISK ADDRESS
3506  031252  004537  015056                 JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
3507  031256  000012                         WRITE
3508  031260  004537  015702                 JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
3509  031264                                 ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  031264  104410                         TRAP    C$ESCAPE
 (3)  031266  000200                         .WORD   10000$-.
```

```
  3510  031270  004537  014614                    JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
  3511  031274                                    ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  031274  104410                            TRAP    C$ESCAPE
   (3)  031276  000170                            .WORD   10000$-.
  3512                                    ;VERIFY WRITE WITH READ BEFORE WRCHK
  3513
  3514  031300  005077  151054                    CLR     @RLDA
  3515  031304  012777  003426  151044            MOV     #BUF,@RLBA
  3516  031312  012777  177600  151042            MOV     #-128.,@RLMP
  3517  031320  004537  015056                    JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
  3518  031324  000014                            READ
  3519  031326  004537  015702                    JSR     R5,WTCRDY
  3520  031332                                    ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  031332  104410                            TRAP    C$ESCAPE
   (3)  031334  000132                            .WORD   10000$-.
  3521  031336  004537  014614                    JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
  3522  031342                                    ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  031342  104410                            TRAP    C$ESCAPE
   (3)  031344  000122                            .WORD   10000$-.
  3523
  3524  031346                                    BGNSEG                              ;%%START OF SEGMENT%%
   (3)  031346  104404                            TRAP    C$BSFG
  3525
  3526
  3527  031350  005037  003426                    CLR     BUF
  3528  031354  005077  151000                    CLR     @RLDA
  3529  031360  012777  003426  150770            MOV     #BUF,@RLBA          ;SETTING SECTOR 40 OF CYL. ADDR.
  3530  031366  012777  177600  150766            MOV     #-128.,@RLMP        ;WORD COUNT
  3531
  3532  031374  004537  015056                    JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
  3533  031400  000002                            WRCHK                       ;WRITE CHECK
  3534  031402  004537  015702                    JSR     R5,WTCRDY           ;WAIT FOR CONTROLLER READY
  3535  031406                                    ESCAPE  SEG                 ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  031406  104410                            TRAP    C$ESCAPE
   (3)  031410  000054                            .WORD   10001$-.
  3536
  3537  031412  013737  002340  002272            MOV     E.CS,TMP0           ;GET RLCS
  3538  031420  042737  001777  002272            BIC     #1777,TMP0          ;SAVE ERROR BITS
  3539  031426  022737  104000  002272            CMP     #BIT15!BIT11,TMP0   ;DCK SET.
  3540  031434  001402                            BEQ     1$                  ;YES, CONTINUE
  3541  031436  004537  014614                    JSR     R5,CHERR
  3542  031442                            1$:     CKLOOP
   (3)  031442  104406                            TRAP    C$CLP1
  3543
  3544  031444  022737  104000  002272            CMP     #BIT15!BIT11,TMP0
  3545  031452  001404                            BEQ     2$
  3546
  3547  031454                                    ERRDF   23.,EM65,ERR0
   (4)  031454  104455                            TRAP    C$ERDF
   (5)  031456  000027                            .WORD   23
   (5)  031460  007364                            .WORD   EM65
   (5)  031462  007510                            .WORD   ERR0
  3548                                                                        ;WHEN FORCED
  3549  031464                            2$:
  3550
  3551  031464                                    ENDSEG                              ;%%END OF SEGMENT%%
  (3)  031464                             10001$:
  (3)  031464  104405                             TRAP    C$ESEG
 3552  031466                                     ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  031466                             10000$:
  (3)  031466  104405                             TRAP    C$ESEG
 3553  031470                             ENDTST                                          ;**END OF TEST**
  (3)  031470                             L10076:
  (3)  031470  104401                             TRAP    C$ETST
 3554
 3555                                     .SBTTL  **TEST 37** - FORCE DCK WITH WRITE CHECK INTERRUPT
 3556
 3557  031472                             BGNTST                                          ;**START OF TEST**
 3558
 3559
 3560  031472                             STARS
  (2)                                     ;;*********************************************************************
 3561                                     ;FORCE A DCK IN INTERRUPT MODE
 3562  031472                             STARS
  (2)                                     ;;*********************************************************************
 3563
 3564
 3565  031472  004737  015766                     JSR     PC,HDHOME          ;HEADS OVER TRACK 0
 3566  031476                                     CKERFG                     ;HEADS GO HOME OKAY
  (4)  031504  104432                             TRAP    C$EXIT
  (4)  031506  000322                             .WORD   L10077-.
 3567
 3568  031510                                     BGNSEG                                  ;%%START OF SEGMENT%%
  (3)  031510  104404                             TRAP    C$BSEG
 3569
 3570  031512  012700  003426                     MOV     #BUF,R0            ;SETUP AND WRITE
 3571  031516  012701  000200                     MOV     #128.,R1           ;128 WORDS
 3572  031522  012720  125252             299$:   MOV     #125252,(R0)+      ;WRITE
 3573  031526  005301                             DEC     R1                 ;DONE??
 3574  031530  001374                             BNE     299$
 3575
 3576  031532  012777  003426  150616             MOV     #BUF,@RLBA         ;LOAD BUS ADDRESS
 3577  031540  012777  177600  150614             MOV     #-128.,@RLMP       ;WORD COUNT
 3578  031546  005077  150606                     CLR     @RLDA              ;CLEAR DISK ADDRESS
 3579  031552  004537  015056                     JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
 3580  031556  000012                             WRITE
 3581  031560  004537  015702                     JSR     R5,WTCRDY          ;WAIT FOR CONTROLLER READY
 3582  031564                                     ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  031564  104410                             TRAP    C$ESCAPE
  (3)  031566  000240                             .WORD   10000$-.
 3583  031570  004537  014614                     JSR     R5,CHERR                    ;CHECK CNTLR FOR ERRORS
 3584  031574                                     ESCAPE  SEG                ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  031574  104410                             TRAP    C$ESCAPE
  (3)  031576  000230                             .WORD   10000$-.
 3585                                     ;VERIFY WRITE WITH READ BEFORE WRCHK
 3586
 3587  031600  005077  150554                     CLR     @RLDA
 3588  031604  012777  003426  150544             MOV     #BUF,@RLBA
 3589  031612  012777  177600  150542             MOV     #-128.,@RLMP
 3590  031620  004537  015056                     JSR     R5,LDFUNC                   ;LOAD THE FUNCTION IN NEXT WORD
 3591  031624  000014                             READ
 3592  031626  004537  015702                     JSR     R5,WTCRDY
 3593  031632                                     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  031632  104410                             TRAP    C$ESCAPE
  (3)  031634  000172                             .WORD   10000$-.
 3594  031636  004537  014614                     JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
 3595  031642                                     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  031642  104410                             TRAP    C$ESCAPE
  (3)  031644  000162                             .WORD   10000$-.
 3596
 3597  031646                                     BGNSEG                            ;%%START OF SEGMENT%%
  (3)  031646  104404                             TRAP    C$BSEG
 3598
 3599  031650                                     SETPRI  #PRI00
  (3)  031650  012700  000000                     MOV     #PRI00,R0
  (3)  031654  104441                             TRAP    C$SPRI
 3600  031656  005037  002256                     CLR     INTFLG           ;CLEAR INTERRUPT OCCURANCE FLAG
 3601  031662  005037  003426                     CLR     BUF
 3602  031666  005077  150466                     CLR     @RLDA
 3603  031672  012777  003426  150456             MOV     #BUF,@RLBA       ;SETTING SECTOR 40 OF CYL. ADDR.
 3604  031700  012777  177600  150454             MOV     #-128.,@RLMP     ;WORD COUNT
 3605
 3606  031706  004537  015056                     JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
 3607  031712  000102                             WRCHK!INTEN              ;WRITE CHECK
 3608  031714  004537  015702                     JSR     R5,WTCRDY        ;WAIT FOR CONTROLLER READY
 3609  031720                                     CKLOOP
  (3)  031720  104406                             TRAP    C$CLP1
 3610  031722                                     SETPRI  #PRI07
  (3)  031722  012700  000340                     MOV     #PRI07,R0
  (3)  031726  104441                             TRAP    C$SPRI
 3611
 3612  031730  005737  002256                     TST     INTFLG           ;DID INTERRUPT OCCUR
 3613  031734  001004                             BNE     2$               ;YES OKAY
 3614
 3615  031736                                     ERRDF   24.,EM66,ERR0    ;NO INTERRUPT FROM DCK
  (4)  031736  104455                             TRAP    C$ERDF
  (5)  031740  000030                             .WORD   24
  (5)  031742  007421                             .WORD   EM66
  (5)  031744  007510                             .WORD   ERR0
 3616
 3617  031746                             2$:     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  031746  104410                             TRAP    C$ESCAPE
  (3)  031750  000054                             .WORD   10001$-.
 3618
 3619
 3620  031752  013737  002340  002272             MOV     E.CS,TMP0        ;GET RLCS
 3621  031760  042737  001777  002272             BIC     #1777,TMP0       ;SAVE ERROR BITS
 3622  031766  022737  104000  002272             CMP     #BIT15!BIT11,TMP0  ;DCK  SET.
 3623  031774  001402                             BEQ     1$               ;YES, CONTINUE
 3624
 3625  031776  004537  014614                     JSR     R5,CHERR
 3626  032002                             1$:     CKLOOP
  (3)  032002  104406                             TRAP    C$CLP1
 3627
 3628  032004  022737  104000  002272             CMP     #BIT15!BIT11,TMP0
 3629  032012  001404                             BEQ     3$
 3630  032014                                     ERRDF   25.,EM65,ERR0
  (4)  032014  104455                             TRAP    C$ERDF
```

```
(5)  032016  000031                                 .WORD   25
(5)  032020  007364                                 .WORD   EM65
(5)  032022  007510                                 .WORD   EPRO
                                                                                 ;WHEN FORCED
     032024                               3$:

     032024                                         ENDSEG                                ;%%END OF SEGMENT%%
(3)  032024                               10001$:
(3)  032024  104405                                 TRAP    C$ESEG
     032026                                         ENDSEG                                ;%%END OF SEGMENT%%
(3)  032026                               10000$:
(3)  032026  104405                                 TRAP    C$ESEG
     032030                               ENDTST                                          ;**END OF TEST**
(3)  032030                               L10077:
(3)  032030  104401                                 TRAP    C$ETST


                                          .SBTTL  **TEST 38** - CHECK ZERO FILL ON WRITE WITH WRITE CHECK

     032032                               BGNTST                                          ;**START OF TEST**



     032032                               STARS
(2)                                       ;;*******************************************************************
                                          ;WHEN WRITING PARTIAL SECTORS (LESS THAN 128 WORDS) THE
                                          ;CONTROLLER WILL FILL IN THE REMAINING PORTION OF
                                          ;THE SECTOR WITH ZERO WORDS.  CHECK THIS FEATURE CAN BE WRITE CHECKED
                                          ;WITH WORD COUNTS FROM 1 TO 127
     032032                               STARS
(2)                                       ;;*******************************************************************

     032032  004737  015766                         JSR     PC,HDHOME                ;HEADS OVER TRACK 0
     032036                                         CKERFG                           ;HEADS GO HOME OKAY
(4)  032044  104432                                 TRAP    C$EXIT
(4)  032046  000274                                 .WORD   L10100-.

     032050                                         BGNSEG                                ;%%START OF SEGMENT%%
(3)  032050  104404                                 TRAP    C$BSEG

     032052  012737  000001  002274                 MOV     #1,TMP1                  ;START WITH 1 WORD WRITE
     032060  012700  003426               33$:      MOV     #BUF,R0                  ;WRITE BUFFER WITH 52525, WE'LL
     032064  012701  000200                         MOV     #128.,R1                 ;WRITE 128 WORDS ALL THOUGH WE'RE
     032070  012720  052525               3$:       MOV     #52525,(R0)+             ;ONLY GOING TO TRANSFER < 128
     032074  005301                                 DEC     R1                       ;DONE WITH BUFFER?
     032076  001374                                 BNE     3$                       ;NO, GO BACK
     032100  013700  002274                         MOV     TMP1,R0                  ;GET TRANSFER WORD COUNT
     032104  005400                                 NEG     R0                       ;NEGATE FOR RLMP
     032106  010077  150250                         MOV     R0,@RLMP                 ;STORE WORD COUNT AWAY
     032112  012777  003426  150236                 MOV     #BUF,@RLBA               ;SET UP RLBA
     032120  005077  150234                         CLR     @RLDA
     032124  004537  015056                         JSR     R5,LDFUNC                      ;LOAD THE FUNCTION IN NEXT WORD
     032130  000012                                 WRITE                            ;WRITE IT
     032132  004537  015702                         JSR     R5,WTCRDY                ;WAIT FOR WRITE TO FINISH
     032136                                         ESCAPE  SEG                      ;CHECK FOR FL:LOE, ELSE EXIT SEG
(3)  032136  104410                                 TRAP    C$ESCAPE
```

```
 (3)  032140  000200                             .WORD   10000$-.

      032142  004537  014614                     JSR     R5,CHERR                   ;CHECK CNTLR FOR ERRORS
      032146                                     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  032146  104410                             TRAP    C$ESCAPE
 (3)  032150  000170                             .WORD   10000$-.
                                         ;VERIFY WRITE WITH READ BEFORE WRCHK

      032152  005077  150202                     CLR     @RLDA
      032156  012777  003426  150172             MOV     #BUF,@RLBA
      032164  013700  002274                     MOV     TMP1,R0
      032170  005400                             NEG     R0
      032172  010077  150164                     MOV     R0,@RLMP
      032176  004537  015056                     JSR     R5,LDFUNC                  ;LOAD THE FUNCTION IN NEXT WORD
      032202  000014                             READ
      032204  004537  015702                     JSR     R5,WTCRDY
      032210                                     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  032210  104410                             TRAP    C$ESCAPE
 (3)  032212  000126                             .WORD   10000$-.
      032214  004537  014614                     JSR     R5,CHERR                   ;CHECK CNTLR FOR ERRORS
      032220                                     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  032220  104410                             TRAP    C$ESCAPE
 (3)  032222  000116                             .WORD   10000$-.

      032224                                     BGNSEG                             ;%%START OF SEGMENT%%
 (3)  032224  104404                             TRAP    C$BSEG
      032226  012777  003426  150122             MOV     #BUF,@RLBA       ;SET UP TO READ
      032234  013700  002274                     MOV     TMP1,R0
      032240  005400                             NEG     R0
      032242  010077  150114                     MOV     R0,@RLMP
      032246  005077  150106                     CLR     @RLDA            ;SECTOR
      032252  004537  015056                     JSR     R5,LDFUNC                  ;LOAD THE FUNCTION IN NEXT WORD
      032256  000002                             WRCHK
      032260  004537  015702                     JSR     R5,WTCRDY        ;WAIT TIL WE FINISH THE WRCHK
      032264                                     ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  032264  104410                             TRAP    C$ESCAPE
 (3)  032266  000034                             .WORD   10001$-.

      032270  004537  014614                     JSR     R5,CHERR                   ;CHECK CNTLR FOR ERRORS
      032274  005737  002236                     TST     T.CRC            ;WAS ERROR A DCK??
      032300  001003                             BNE     8$               ;YES, GIVE MOR INFO
      032302                             10$:    ESCAPE  SEG              ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)  032302  104410                             TRAP    C$ESCAPE
 (3)  032304  000016                             .WORD   10001$-.
      032306  000405                             BR      99$              ;SKIP AROUND
      032310                             8$:     CKLOOP                   ;YES, CHECK FOR LOOP FIRST
 (3)  032310  104406                             TRAP    C$CLP1
      032312                                     ERRDF   37.,EM64,ERR14
 (4)  032312  104455                             TRAP    C$ERDF
 (5)  032314  000045                             .WORD   37
 (5)  032316  007321                             .WORD   EM64
 (5)  032320  010414                             .WORD   ERR14
      032322                             99$:                             ;EXIT TEST
      032322                                     ENDSEG                             ;%%END OF SEGMENT%%
 (3)  032322                             10001$:
 (3)  032322  104405                             TRAP    C$ESEG
```

```

     032324  005237  002274                              INC     TMP1
     032330  023727  002274  000200                      CMP     TMP1,#128.
     032336  001250                                      BNE     33$

     032340                                              ENDSEG                                  ;%%END OF SEGMENT%%
 (3) 032340                                   10000$:
 (3) 032340  104405                                      TRAP    C$ESEG
     032342                                   ENDTST                                          ;**END OF TEST**
 (3) 032342                                   L10100:
 (3) 032342  104401                                      TRAP    C$ETST



                                              .SBTTL  **TEST 39** - EXTENDED CHECK OF WRITE CHECK FUNCTION

     032344                                   BGNTST                                          ;**START OF TEST**

     032344                                   STARS
 (2)                                          ;;*********************************************************************
                                              ;CHECK OF WRITE CHECK LOGIC UNDER FLAG MODE
                                              ;TEST IS DONE WITH ALL BIT PATTERNS
                                              ; WE WILL WRITE CHECK A FULL SECTOR (128 WORDS) FROM
                                              ;MEMORY (BUF).  WE CHECK THAT NO ERRORS OCCUR.
     032344                                   STARS
 (2)                                          ;;*********************************************************************


     032344  004737  015766                              JSR     PC,HDHOME               ;HEADS OVER TRACK 0
     032350                                              CKERFG                          ;HEADS GO HOME OKAY
 (4) 032356  104432                                      TRAP    C$EXIT
 (4) 032360  000306                                      .WORD   L10101-.

     032362  022737  000001  002232                      CMP     #1,T.DRIVE                      ;CHECK TYPE OF DRIVE
     032370  001003                                      BNE     22$                             ;NOT RL01 THEN BRANCH
     032372  012703  002670                              MOV     #HDRTAB,R3                      ;MOV #HDRTAB TO R3
     032376  000402                                      BR      33$                             ;THEN BRANCH
     032400  012703  003050                   22$:       MOV     #HTAB,R3                        ;MOV #HTAB TO R3 (RL02)

     032404                                   33$:       BGNSEG                          ;START OF SEGMENT
 (3) 032404  104404                                      TRAP    C$BSEG

     032406  012700  003426                   298$:      MOV     #BUF,R0                 ;SETUF AND WRITE
     032412  012701  000200                              MOV     #128.,R1                ;128 WORDS
     032416  011302                                      MOV     (R3),R2                 ;GET PATTERN
     032420  052702  100000                              BIS     #BIT15,R2
     032424  010220                           299$:      MOV     R2,(R0)+
     032426  005301                                      DEC     R1                      ;DONE??
     032430  001375                                      BNE     299$

     032432  012777  003426  147716                      MOV     #BUF,@RLBA              ;LOAD BUS ADDRESS
     032440  012777  177600  147714                      MOV     #-128.,@RLMP            ;WORD COUNT
     032446  005077  147706                              CLR     @RLDA                   ;CLEAR DISK ADDRESS
     032452  004537  015056                              JSR     R5,LDFUNC                       ;LOAD THE FUNCTION IN NEXT WORD
     032456  000012                                      WRITE
     032460  004537  015702                              JSR     R5,WTCRDY               ;WAIT FOR CONTROLLER READY
     032464                                              ESCAPE  SEG                     ;CHECK FOR FL:LOE, ELSE EXIT SEG
```

```
  (3)  032464  104410                          TRAP    C$ESCAPE
  (3)  032466  000176                          .WORD   10000$-.
 3756  032470  004537  014614                  JSR     R5,CHERR                 ;CHECK CNTLR FOR ERRORS
 3757  032474                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  032474  104410                          TRAP    C$ESCAPE
  (3)  032476  000166                          .WORD   10000$-.
 3758  032500                                  BGNSEG                           ;%%START OF SEGMENT%%
  (3)  032500  104404                          TRAP    C$BSEG
 3759
 3760                                  ;VERIFY WRITE WITH READ BEFORE WRCHK
 3761
 3762  032502  005077  147652                  CLR     @RLDA
 3763  032506  012777  003426  147642          MOV     #BUF,@RLBA
 3764  032514  012777  177600  147640          MOV     #-128.,@RLMP
 3765  032522  004537  015056                  JSR     R5,LDFUNC                ;LOAD THE FUNCTION IN NEXT WORD
 3766  032526  000014                          READ
 3767  032530  004537  015702                  JSR     R5,WTCRDY
 3768  032534                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  032534  104410                          TRAP    C$ESCAPE
  (3)  032536  000076                          .WORD   10001$-.
 3769  032540  004537  014614                  JSR     R5,CHERR                 ;CHECK CNTLR FOR ERRORS
 3770  032544                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  032544  104410                          TRAP    C$ESCAPE
  (3)  032546  000066                          .WORD   10001$-.
 3771
 3772  032550                                  BGNSEG                           ;%%START OF SEGMENT%%
  (3)  032550  104404                          TRAP    C$BSEG
 3773
 3774  032552                          3$:
 3775  032552  005077  147602                  CLR     @RLDA
 3776  032556  012777  177600  147576          MOV     #-128.,@RLMP    ;WORD COUNT
 3777  032564  012777  003426  147564          MOV     #BUF,@RLBA      ;BUS ADDRESS
 3778  032572  004537  015056                  JSR     R5,LDFUNC                ;LOAD THE FUNCTION IN NEXT WORD
 3779  032576  000002                          WRCHK                   ;WRITE CHECK
 3780
 3781  032600  004537  015702                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
 3782  032604                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  032604  104410                          TRAP    C$ESCAPE
  (3)  032606  000024                          .WORD   10002$-.
 3783
 3784
 3785  032610  004537  014614                  JSR     R5,CHERR                 ;CHECK CNTLR FOR ERRORS
 3786  032614  005737  002236                  TST     T.CRC
 3787  032620  001404                          BEQ     4$
 3788
 3789  032622                                  ERRHRD  410.,ERR15,EM70
  (4)  032622  104456                          TRAP    C$ERHRD
  (5)  032624  000632                          .WORD   410
  (5)  032626  010462                          .WORD   ERR15
  (5)  032630  007472                          .WORD   EM70
 3790
 3791  032632                          4$:
 3792
 3793
 3794  032632                                  ENDSEG                           ;%%END OF SEGMENT%%
  (3)  032632                          10002$:
```

```
  (3)  032632  104405                          TRAP    C$ESEG
 3795  032634                                  ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  032634                          10001$:
  (3)  032634  104405                          TRAP    C$ESEG
 3796
 3797  032636  005723                          TST     (R3)+
 3798  032640  022737  000001  002232          CMP     #1,T.DRIVE                      ;RL01 OR RL02?
 3799  032646  001003                          BNE     60$                             ;RL02? THEN BRANCH
 3800  032650  020327  003046                  CMP     R3,#HDREND                      ;LAST OF PATERN?
 3801  032654  000402                          BR      77$
 3802  032656  020327  003234          60$:    CMP     R3,#HEND                        ;LAST OF PATTERN (RL02)
 3803  032662  001251                  77$:    BNE     298$
 3804
 3805  032664                                  ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  032664                          10000$:
  (3)  032664  104405                          TRAP    C$ESEG
 3806  032666                          ENDTST                                          ;**END OF TEST**
  (3)  032666                          L10101:
  (3)  032666  104401                          TRAP    C$ETST
 3807                                  .SBTTL  **TEST 40** - READ WITHOUT HEADER COMPARE FUNCTION
 3808
 3809  032670                          STARS
  (2)                                  ;;*****************************************************************
 3810                                  ;TEST THAT READ WITHOUT HEADER VERIFICATION WORKS.  THIS FUNCTION SHOULD
 3811                                  ;READ AT THE NEXT SECTOR ENCOUNTERED.  SET THE RLDA TO 0
 3812                                  ;AND ISSUE THE FUNCTION IN FLAG MODE.  UPON COMPLETION CHECK
 3813                                  ;FOR ERRORS
 3814  032670                          STARS
  (2)                                  ;;*****************************************************************
 3815  032670                          BGNTST                                          ;**START OF TEST**
 3816
 3817
 3818  032670  004737  015766                  JSR     PC,HDHOME               ;HEADS OVER TRACK 0
 3819  032674                                  CKERFG                          ;HEADS GO HOME OKAY
  (4)  032702  104432                          TRAP    C$EXIT
  (4)  032704  000052                          .WORD   L10102-.
 3820
 3821  032706                                  BGNSEG                                  ;%%START OF SEGMENT%%
  (3)  032706  104404                          TRAP    C$BSEG
 3822
 3823
 3824  032710  012777  177600  147444          MOV     #-128.,@RLMP            ;SET UP WORD COUNT
 3825  032716  012777  003426  147432          MOV     #BUF,@RLBA              ;SETUP BUS ADDRESS
 3826  032724  012777  177777  147426          MOV     #-1,@RLDA               ;HEADER SHOULDN'T MATTER
 3827  032732  004537  015056                  JSR     R5,LDFUNC                       ;LOAD THE FUNCTION IN NEXT WORD
 3828  032736  000016                          RDNHD                           ;READ DATA WITHOUT HEADER VERIFY
 3829  032740  004537  015702                  JSR     R5,WTCRDY               ;WAIT FOR IT TO FINISH
 3830  032744                                  ESCAPE  SEG                     ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  032744  104410                          TRAP    C$ESCAPE
  (3)  032746  000006                          .WORD   10000$-.
 3831
 3832  032750  004537  014614                  JSR     R5,CHERR                        ;CHECK CNTLR FOR ERRORS
 3833
 3834  032754                                  ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  032754                          10000$:
  (3)  032754  104405                          TRAP    C$ESEG
```

```
        032756                          ENDTST                                  ;**END OF TEST**
 (3)    032756                          L10102:
 (3)    032756  104401                          TRAP    C$ETST

                                        .SBTTL  **TEST 41** - READ WITHOUT HEADER COMPARE FUNCTION INTERRUPT

        032760                          BGNTST                                  ;**START OF TEST**

        032760                          STARS
 (2)                                    ;;****************************************************************
                                        ;TEST THAT READ WITHOUT HEADER VERIFICATION WORKS IN
                                        ;INTERRUPT MODE.
        032760                          STARS
 (2)                                    ;;****************************************************************

        032760  004737  015766                  JSR     PC,HDHOME       ;HEADS OVER TRACK 0
        032764                                  CKERFG                  ;HEADS GO HOME OKAY
 (4)    032772  104432                          TRAP    C$EXIT
 (4)    032774  000114                          .WORD   L10103-.

        032776                                  BGNSEG                          ;%%START OF SEGMENT%%
 (3)    032776  104404                          TRAP    C$BSEG

        033000  005037  002256                  CLR     INTFLG  ;CLEAR INTERRUPT OCCURANCE FLAG
        033004  012777  177600  147350          MOV     #-128.,@RLMP    ;SET UP WORD COUNT FOR ONE SECTOR
        033012  012777  003426  147336          MOV     #BUF,@RLBA      ;SETUP BUFFER ADDRESS
        033020  012777  177777  147332          MOV     #-1,@RLDA       ;DISK ADDRESS IS A DON'T CARE
        033026                                  SETPRI  #PRI00
 (3)    033026  012700  000000                  MOV     #PRI00,R0
 (3)    033032  104441                          TRAP    C$SPRI
        033034  004537  015056                  JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
        033040  000116                          RDNHD!INTEN             ;INTERRUPT ENABLED
        033042  004537  015702                  JSR     R5,WTCRDY       ;WAIT FOR INTERRUPT
        033046                                  SETPRI  #PRI07
 (3)    033046  012700  000340                  MOV     #PRI07,R0
 (3)    033052  104441                          TRAP    C$SPRI
        033054                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)    033054  104410                          TRAP    C$ESCAPE
 (3)    033056  000030                          .WORD   10000$-.

        033060  005737  002256                  TST     INTFLG          ;DID IT INTERRUPT
        033064  001004                          BNE     1$              ;IF INTERRUPT GO TO 1$

        033066                                  ERRDF   40.,EM40,ERR0   ;NO INTERRUPT
 (4)    033066  104455                          TRAP    C$ERDF
 (5)    033070  000050                          .WORD   40
 (5)    033072  006321                          .WORD   EM40
 (5)    033074  007510                          .WORD   ERR0
        033076                          1$:     ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
 (3)    033076  104410                          TRAP    C$ESCAPE
 (3)    033100  000006                          .WORD   10000$-.

        033102  004537  014614                  JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS

        033106                                  ENDSEG                          ;%%END OF SEGMENT%%
 (3)    033106                          10000$:
   (3)  033106  104405                          TRAP    C$ESEG
  3871  033110                          ENDTST                                  ;**END OF TEST**
   (3)  033110                          L10103:
   (3)  033110  104401                          TRAP    C$ETST
  3872
  3873                                  .SBTTL  **TEST 42** - CHECK RD W/O HDR CMP ACTUALLY READS
  3874
  3875  033112                          BGNTST                                  ;**START OF TEST**
  3876
  3877  033112                          STARS
   (2)                                  ;;*******************************************************************
  3878                                  ;CHECK THAT THE READ W/O HDR CMP FUNCTION ACTUALLY READS (INTO MEMORY)
  3879                                  ;WE WILL WRITE A PATTERN INTO MEMORY AND THEN ISSUE
  3880                                  ;A READ TO OVERLAY THAT PATTERN.  AFTER THE READ
  3881                                  ;WE CHECK TO SEE IF THE WRITTEN PATTERN HAS CHANGED.
  3882                                  ;IF NOT WE ISSUE IT AGAIN AT THE SAME SECTION AFTER
  3883                                  ;HAVING MODIFIED OUR PATTERN IN MEMORY (SINCE THERE IS
  3884                                  ;ONE CHANCE THAT THE DISK COULD HAVE OUR PATTERN).  AFTER
  3885                                  ;THE SECOND READ WE CHECK THE BUFFER AGAIN.  IF IT'S
  3886                                  ;NOT CHANGED WE REPORT AN ERROR
  3887  033112                          STARS
   (2)                                  ;;*******************************************************************
  3888
  3889
  3890  033112  004737  015766                  JSR     PC,HDHOME       ;HEADS OVER TRACK 0
  3891  033116                                  CKERFG                  ;HEADS GO HOME OKAY
   (4)  033124  104432                          TRAP    C$EXIT
   (4)  033126  000160                          .WORD   L10104-.
  3892
  3893  033130                                  BGNSEG                          ;%%START OF SEGMENT%%
   (3)  033130  104404                          TRAP    C$BSEG
  3894
  3895  033132  012737  024350  002272          MOV     #24350,TMP0     ;SET PATTERN TO WRITE
  3896  033140  005037  002274                  CLR     TMP1            ;CLEAR PASS INDICATOR
  3897  033144  012700  003426          1$:     MOV     #BUF,R0         ;SET UP BUFFER BEGINNING
  3898  033150  012701  000200                  MOV     #128.,R1
  3899  033154  013720  002272          2$:     MOV     TMP0,(R0)+      ;WRITE BUFFER
  3900  033160  005301                          DEC     R1              ;DONE??
  3901  033162  001374                          BNE     2$              ;NO, GO BACK
  3902  033164  012777  000050  147166          MOV     #40.,@RLDA      ;LOAD DISK ADDRESS TO NONSENSE
  3903  033172  012777  177600  147162          MOV     #-128.,@RLMP    ;SET WORD COUNT
  3904  033200  012777  003426  147150          MOV     #BUF,@RLBA      ;LOAD BUS ADDRESS
  3905  033206  012737  003426  002300          MOV     #BUF,GDDAT      ;FOR ERROR PRINT
  3906
  3907  033214  004537  015056                  JSR     R5,LDFUNC               ;LOAD THE FUNCTION IN NEXT WORD
  3908  033220  000016                          RDNHD                   ;READ W/O HDR CMP
  3909  033222  004537  015702                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY
  3910  033226                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  033226  104410                          TRAP    C$ESCAPE
   (3)  033230  000054                          .WORD   10000$-.
  3911
  3912  033232  004537  014614                  JSR     R5,CHERR                ;CHECK CNTLR FOR ERRORS
  3913  033236                                  ESCAPE  SEG             ;CHECK FOR FL:LOE, ELSE EXIT SEG
   (3)  033236  104410                          TRAP    C$ESCAPE
   (3)  033240  000044                          .WORD   10000$-.
  3914
```

```
 3915  033242  012702  003426                      MOV     #BUF,R2          ;SET TO START COMPARING DATA
 3916  033246  022237  002272          4$:         CMP     (R2)+,TMPO       ;DID DATA CHANGE?
 3917  033252  001014                              BNE     6$               ;YES, CHECK FOR END
 3918                                                                       ;
 3919
 3920                                                                       ;DATA DIDN'T CHANGE, CHECK
 3921  033254  005737  002274                      TST     TMP1             ;IF 1ST OR 2ND TIME?
 3922  033260  001005                              BNE     5$               ;2ND-REPORT 1ST-TRY AGAIN
 3923
 3924  033262  005237  002274                      INC     TMP1             ;INC PASS COUNT
 3925  033266  005137  002272                      COM     TMPO             ;COMPLIMENT PATTERN
 3926  033272  000724                              BR      1$               ;GO DO IT AGAIN
 3927
 3928  033274                          5$:         ERRDF   20.,EM55,ERR9
  (4)  033274  104455                              TRAP    C$ERDF
  (5)  033276  000024                              .WORD   20
  (5)  033300  006652                              .WORD   EM55
  (5)  033302  010102                              .WORD   ERR9
 3929
 3930  033304                          6$:
 3931
 3932  033304                                      ENDSEG                             ;%%END OF SEGMENT%%
  (3)  033304                          10000$:
  (3)  033304  104405                              TRAP    C$ESEG
 3933  033306                          ENDTST                                     ;**END OF TEST**
  (3)  033306                          L10104:
  (3)  033306  104401                              TRAP    C$ETST
 3934
 3935                                  .SBTTL      **TEST 43** - CHECK RLBA INCREMENT WITH RD W/O HDR CMP
 3936
 3937  033310                          BGNTST                                     ;**START OF TEST**
 3938
 3939  033310                          STARS
  (2)                                  ;;*********************************************************************
 3940                                  ;CHECK THAT THE RLBA WILL INCREMENT WITH THE READ W/O HDR CMP
 3941                                  ;THE RLBA SHOULD CONTAIN 'BUF +256.'' AFTER A FULL SECTOR
 3942                                  ;READ.
 3943  033310                          STARS
  (2)                                  ;;*********************************************************************
 3944
 3945
 3946  033310  004737  015766                      JSR     PC,HDHOME        ;HEADS OVER TRACK 0
 3947  033314                                      CKERFG                   ;HEADS GO HOME OKAY
  (4)  033322  104432                              TRAP    C$EXIT
  (4)  033324  000120                              .WORD   L10105-.
 3948
 3949  033326                                      BGNSEG                             ;%%START OF SEGMENT%%
  (3)  033326  104404                              TRAP    C$BSEG
 3950
 3951  033330  012777  000050  147022              MOV     #40.,@RLDA
 3952  033336  012777  003426  147012              MOV     #BUF,@RLBA       ;SET UP BUS ADDRESS
 3953  033344  012777  177600  147010              MOV     #-128.,@RLMP     ;WORD COUNT
 3954  033352  012737  003426  002300              MOV     #BUF,GDDAT       ;FORM EXPECTED BUS ADDRESS
 3955  033360  062737  000400  002300              ADD     #256.,GDDAT      ;AFTER READ
 3956
 3957  033366  004537  015056                      JSR     R5,LDFUNC                  ;LOAD THE FUNCTION IN NEXT WORD
 3958  033372  000016                          RDNHD                           ;READ W/O HDR CMP
 3959  033374  004537  015702                  JSR     R5,WTCRDY               ;WAIT FOR CONTROLLER READY
 3960  033400                                  ESCAPE  SEG                     ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  033400  104410                          TRAP    C$ESCAPE
  (3)  033402  000040                          .WORD   10000$-.
 3961
 3962  033404  004537  014614                  JSR     R5,CHERR                        ;CHECK CNTLR FOR ERRORS
 3963  033410                                  ESCAPE  SEG                     ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  033410  104410                          TRAP    C$ESCAPE
  (3)  033412  000030                          .WORD   10000$-.
 3964  033414  013737  002342  002302          MOV     E.BA,BDDAT              ;READ 'RLBA' FOR PRESENT ADDRESS
 3965  033422  023737  002302  002300          CMP     BDDAT,GDDAT             ;DID 'BA' INCREMENT PROPERLY?
 3966  033430  001404                          BEQ     1$                      ;YES, CONTINUE
 3967
 3968  033432                                  ERRDF   21.,EM53,ERR4
  (4)  033432  104455                          TRAP    C$ERDF
  (5)  033434  000025                          .WORD   21
  (5)  033436  006717                          .WORD   EM53
  (5)  033440  007654                          .WORD   ERR4
 3969
 3970  033442                          1$:
 3971
 3972  033442                                  ENDSEG                                  ;%%END OF SEGMENT%%
  (3)  033442                          10000$:
  (3)  033442  104405                          TRAP    C$ESEG
 3973  033444                          ENDTST                                          ;**END OF TEST**
  (3)  033444                          L10105:
  (3)  033444  104401                          TRAP    C$ETST
 3974
 3975
 3976
 3977
 3978
 3979
 3980
 3981                                  .SBTTL  **TEST 44** - CHECK RLDA DOES INCREMENT WITH RD W/O HDR CMP
 3982
 3983  033446                          BGNTST                                          ;**START OF TEST**
 3984
 3985  033446                          STARS
  (2)                                  ;;*****************************************************************
 3986                                  ;CHECK THAT THE RLDA DOES INCREMENT BY ONE AFTER A
 3987                                  ;FULL SECTOR READ W/O HDR CMP
 3988                                  ;AFTER THE READ THE RLDA SHOULD STILL BE THE INITIAL RLDA + 1
 3989  033446                          STARS
  (2)                                  ;;*****************************************************************
 3990
 3991  033446  004737  015766                  JSR     PC,HDHOME               ;HEADS OVER TRACK 0
 3992  033452                                  CKERFG                          ;HEADS GO HOME OKAY
  (4)  033460  104432                          TRAP    C$EXIT
  (4)  033462  000116                          .WORD   L10106-.
 3993
 3994  033464                                  BGNSEG                                  ;%%START OF SEGMENT%%
  (3)  033464  104404                          TRAP    C$BSEG
 3995
 3996
 3997  033466  012737  000050  002300              MOV     #40.,GDDAT        ;DA TO NONSENSE
 3998  033474  013777  002300  146656              MOV     GDDAT,@RLDA       ;SETUP DISK ADDRESS
 3999  033502  005237  002300                      INC     GDDAT
 4000  033506  012777  177600  146646              MOV     #-128.,@RLMP      ;WORD COUNT
 4001  033514  012777  003426  146634              MOV     #BUF,@RLBA        ;SETUP BUS ADDRESS
 4002
 4003  033522  004537  015056                      JSR     R5,LDFUNC                 ;LOAD THE FUNCTION IN NEXT WORD
 4004  033526  000016                              RDNHD                     ;READ WITHOUT HEADER COMPARE
 4005  033530  004537  015702                      JSR     R5,WTCRDY         ;WAIT FOR CONTROLLER READY
 4006  033534                                      ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  033534  104410                              TRAP    C$ESCAPE
  (3)  033536  000040                              .WORD   10000$-.
 4007
 4008  033540  004537  014614                      JSR     R5,CHERR                  ;CHECK CNTLR FOR ERRORS
 4009  033544                                      ESCAPE  SEG               ;CHECK FOR FL:LOE, ELSE EXIT SEG
  (3)  033544  104410                              TRAP    C$ESCAPE
  (3)  033546  000030                              .WORD   10000$-.
 4010
 4011  033550  013737  002344  002302              MOV     E.DA,BDDAT        ;READ DISK ADDRESS
 4012  033556  023737  002300  002302              CMP     GDDAT,BDDAT       ;DID SECTOR INCREMENT PROPERLY
 4013  033564  001404                              BEQ     1$                ;YES, BRANCH  NO, REPORT ERROR
 4014
 4015  033566                                      ERRDF   22.,EM54,ERR4
  (4)  033566  104455                              TRAP    C$ERDF
  (5)  033570  000026                              .WORD   22
  (5)  033572  006764                              .WORD   EM54
  (5)  033574  007654                              .WORD   ERR4
 4016
 4017  033576                             1$:
 4018
 4019  033576                                      ENDSEG                            ;%%END OF SEGMENT%%
  (3)  033576                             10000$:
  (3)  033576  104405                              TRAP    C$ESEG
 4020  033600                             ENDTST                                     ;**END OF TEST**
  (3)  033600                             L10106:
  (3)  033600  104401                              TRAP    C$ETST
 4021
 4022
 4023
 4024
 4025  033602                             BGNMOD   HRDPRM
 4026
 4027  033602                                      BGNHRD
  (3)  033602  000030                              .WORD L10107-L$HARD/2
 4028
 4029  033604                                      GPRML   CNTYPE,CNT,1,YES
  (4)  033604  005130                              .WORD   T$CODE
  (4)  033606  033664                              .WORD   CNTYPE
  (4)  033610  000001                              .WORD   1
 4030  033612                                      GPRMA   CSRMSG,CSR,0,160000,177776,YES
  (4)  033612  000031                              .WORD   T$CODE
  (4)  033614  033671                              .WORD   CSRMSG
  (4)  033616  160000                              .WORD   T$LOLIM
  (4)  033620  177776                              .WORD   T$HILIM
 4031  033622                                      GPRML   DRTYPE,TYPDR,1,YES
  (4)  033622  003130                              .WORD   T$CODE
  (4) 033624 033716                                .WORD   DRTYPE
  (4) 033626 000001                                .WORD   1
 4032 033630                                       GPRMA   VECMSG,VECT,0,0,776,YES
  (4) 033630 001031                                .WORD   T$CODE
  (4) 033632 033740                                .WORD   VECMSG
  (4) 033634 000000                                .WORD   T$LOLIM
  (4) 033636 000776                                .WORD   T$HILIM
 4033 033640                                       GPRMD   BRMSG,PRIOR,0,340,0,7,YES
  (4) 033640 002032                                .WORD   T$CODE
  (4) 033642 033705                                .WORD   BRMSG
  (4) 033644 000340                                .WORD   340
  (4) 033646 000000                                .WORD   T$LOLIM
  (4) 033650 000007                                .WORD   T$HILIM
 4034 033652                                       GPRMD   DRMSG,DRBT,0,03400,0,7,YES
  (4) 033652 004032                                .WORD   T$CODE
  (4) 033654 033747                                .WORD   DRMSG
  (4) 033656 003400                                .WORD   03400
  (4) 033660 000000                                .WORD   T$LOLIM
  (4) 033662 000007                                .WORD   T$HILIM
 4035
 4036 033664                                       ENDHRD
  (2)                                              .EVEN
  (3) 033664                             L10107:
 4037
 4038 033664 046122  030461     000      CNTYPE:  .ASCIZ  /RL11/
 4039 033671    102  051525  040440      CSRMSG:  .ASCIZ  /BUS ADDRESS/
      033676 042104  042522  051523
      033704    000
 4040 033705    102  020122  042514      BRMSG:   .ASCIZ  /BR LEVEL/
      033712 042526  000114
 4041 033716 051104  053111  020105      DRTYPE:  .ASCIZ  /DRIVE TYPE = RL01/
      033724 054524  042520  036440
      033732 051040  030114  000061
 4042 033740 042526  052103  051117      VECMSG:  .ASCIZ  /VECTOR/
      033746    000
 4043 033747    104  044522  042526      DRMSG:   .ASCIZ  /DRIVE/
      033754    000
 4044        033756                      .EVEN
 4045
 4046 033756                                       ENDMOD
 4047
 4048
 4049 033756                             BGNMOD   SFTPRM
 4050
 4051 033756                                       BGNSFT
  (3) 033756 000022                                .WORD L10110-L$SOFT/2
 4052
 4053 033760                                       GPRML   DMSG,DLT,1,YES
  (4) 033760 000130                                .WORD   T$CODE
  (4) 033762 034024                                .WORD   DMSG
  (4) 033764 000001                                .WORD   1
 4054 033766                                       XFERF   1$
  (5) 033766 006044                                .WORD   T$CODE
 4055 033770                                       GPRMD   EMSG,ELT,D,177777,0,177777,YES
  (4) 033770 001052                                .WORD   T$CODE
  (4) 033772 034131                                .WORD   EMSG
  (4)  033774  177777                                  .WORD   177777
  (4)  033776  000000                                  .WORD   T$LOLIM
  (4)  034000  177777                                  .WORD   T$HILIM
 4056  034002                                 1$:      GPRML   CMSG,DMPCK,1,YES
  (4)  034002  003130                                  .WORD   T$CODE
  (4)  034004  034050                                  .WORD   CMSG
  (4)  034006  000001                                  .WORD   1
 4057  034010                                          XFERF   2$
  (5)  034010  006044                                  .WORD   T$CODE
 4058  034012                                          GPRMD   LMSG,DLMT,D,177777,1,128.,YES
  (4)  034012  004052                                  .WORD   T$CODE
  (4)  034014  034074                                  .WORD   LMSG
  (4)  034016  177777                                  .WORD   177777
  (4)  034020  000001                                  .WORD   T$LOLIM
  (4)  034022  000200                                  .WORD   T$HILIM
 4059  034024                                 2$:
 4060
 4061
 4062  034024                                          ENDSFT
  (2)                                                  .EVEN
  (3)  034024                                 L10110:
 4063
 4064  034024  051104  050117  047440         DMSG:    .ASCIZ  /DROP ON ERROR LIMIT/
       034032  020116  051105  047522
       034040  020122  044514  044515
       034046  000124
 4065  034050  047503  050115  051101         CMSG:    .ASCIZ  /COMPARE DATA ON DCK/
       034056  020105  040504  040524
       034064  047440  020116  041504
       034072  000113
 4066  034074  020043  043117  053440         LMSG:    .ASCIZ  /# OF WORDS IN ERROR REPORTED/
       034102  051117  051504  044440
       034110  020116  051105  047522
       034116  020122  042522  047520
       034124  052122  042105     000
 4067  034131     105  051122  051117         EMSG:    .ASCIZ  /ERROR LIMIT/
       034136  046040  046511  052111
       034144     000
 4068
 4069  034145                                          ENDMOD
 4070
 4071
 4072  034145                                 LASTAD
  (2)          034146                                  .EVEN
  (4)  034146  000000                                  .WORD   0
  (4)  034150  000000                                  .WORD   0
  (3)  034152                                 L$LAST::
 4073
 4074          000001                         .END
```

```
ADR    = 000020 G      54#
AFREG    003500       337#   605
AFTER    015416      1123#  1194   1199   3097   3104
ANS    = 000012       101#
ARLBA    003435       333#   603    605
ARLCS    003430       332#   603    605
ARLDA    003443       334#   604    606
ARLMP    003451       335#   604    606
ASSEMB=  000010        31
BA16   = 000020        62#  1824   1867   1887   2481   2517
BA17   = 000040        61#  1831   1880   2481   2517
BCCFBK   002266       124#  1138*  1144*  1147*  1150   1154
BCSR     002364       155#   724*   730
BDDAT    002302       130#   454    465    476    519    541    552    563    573   1400*  1401   1443*  1444
                     1581*  1614*  1616   1618   1669*  1670   1726*  1727   1775*  1776   1839*  1894*  2069*
                     2070   2111*  2112   2282*  2283*  2286   2326*  2327*  2383*  2384   2426*  2427*  2428
                     2433   2601*  2602   2616   2691*  2692   2707   2790*  2791   2805   2886*  2887   2901
                     3001*  3002   3016   3311*  3312   3383*  3384   3467*  3468   3964*  3965   4011*  4012
BEFORE   015364      1073   1114#  3085
BEREG    003457       336#   603
BIT0   = 000001 G      54#    55     79    195    251
BIT00  = 000001 G      54#
BIT01  = 000002 G      54#
BIT02  = 000004 G      54#
BIT03  = 000010 G      54#
BIT04  = 000020 G      54#
BIT05  = 000040 G      54#
BIT06  = 000100 G      54#
BIT07  = 000200 G      54#
BIT08  = 000400 G      54#
BIT09  = 001000 G      54#
BIT1   = 000002 G      54#    69     71     73     75     76     78    196    252   1784
BIT10  = 002000 G      54#    59    205    261   1482   1488   1536   1542   2150   2200   2317   2322
BIT11  = 004000 G      54#   206    262   1007   1016   3539   3544   3622   3628
BIT12  = 010000 G      54#   207    263   1011   1021   1482   1488   1536   1542   2150   2200   2317   2322
BIT13  = 020000 G      54#    63    208    264   1315
BIT14  = 040000 G      54#    58    209    265   1041
BIT15  = 100000 G      54#    57    266   1482   1488   1536   1542   2150   2200   2317   2322   3539   3544
                     3622   3628   3744
BIT2   = 000004 G      54#    70     71     74     75     80    197    253
BIT3   = 000010 G      54#    72     73     74     75     77    198    254
BIT4   = 000020 G      54#    62     83    199    255
BIT5   = 000040 G      54#    61    200    256
BIT6   = 000100 G      54#    56     81     82    201    257
BIT7   = 000200 G      54#    60     76    202    258
BIT8   = 000400 G      54#    65     67    203    259
BIT9   = 001000 G      54#    66     67    204    260
BOE    = 000400 G      54#
BPRIOR   002370       157#   726*
BRMSG    033705      4033   4040#
BUF      003426       321#   584   1297   1348   1388   1390   1433   1472   1517   1579   1658   1703   1711
                     1720   1924   1958   2002   2009   2010   2020   2057   2059   2101   2140   2181   2296
                     2309   2372   2420   2558   2565   2574   2581   2598   2647   2653   2663   2669   2688
                     2744   2750   2761   2767   2787   2839   2847   2857   2862   2883   2950   2957   2970
                     2977   2999   3046   3052   3066   3079   3130   3136   3150   3164   3196   3202   3214
                     3229   3268   3274   3286   3299   3301   3339   3345   3357   3373   3417   3423   3440
```

```
                         3456    3497    3503    3515    3527*   3529    3570    3576    3588    3601*   3603    3658    3666
                         3678    3690    3741    3749    3763    3777    3825    3853    3897    3904    3905    3915    3952
                         3954    4001
BVEC    002366            156#    725*    759     801    1574    1575    1621    1622
B.BA    002332            142#    603    1115*
B.CS    002330            141#    603    1045*   1046*   1047    1114*   3086*   3087*   3088*
B.DA    002334            143#    604    1043*   1050    1116*
B.MP    002336            144#    604    1117*
CALBCC  002270            125#   1161*
CDCNT   002242            114#   2596*   2605    2608*   2685*   2695    2698*   2784*   2794    2797*   2878*   2890    2893*
                         2996*   3005    3008*
CHECK   002234            111#   2597*   2610    2613*   2686*   2700    2704*   2785*   2799    2802*   2879*   2895    2898*
                         2997*   3010    3013*
CHERR   014614            985#   1217    1227    1242    1249    1363    1398    1440    1485    1539    1666    1717    1821
                         1877    1931    1973    2017    2067    2108    2245    2269    2279    2303    2319    2380    2430
                         2571    2587    2660    2676    2758    2775    2854    2870    2985    3059    3072    3143    3156
                         3172    3209    3220    3244    3281    3292    3309    3352    3363    3380    3432    3446    3464
                         3510    3521    3541    3583    3594    3625    3673    3686    3700    3756    3769    3785    3832
                         3868    3912    3962    4008
CKERLT  014530            438     447     457     468     479     489     501     509     522     533     544     555     566
                          576     587     596     954#
CLKFLD  002666            189#    870*    877     948*
CLKINT  014506            905     910     935#
CLKTIK  014522            871     946#
CLNCOD  013466 G          794#
CMSG    034050           4056    4065#
CNT   = 000012             92#   4029
CNTYPE  033664           4029    4038#
COMP    003645            349#    993
CONT    013020            697     709     730#
CONTIN  012666            701     708#
CRDY  = 000200             60#    798    1188    3091
CRTIM   003521            338#   1196    3098
CSR   = 000000             87#   4030
CSRMSG  033671           4030    4039#
CYLMSK  002314            135#
C$AU  = 000052             31#
C$AUTO= 000061             31#    787
C$BRK = 000022             31#
C$BSEG= 000004             31#   1208    1292    1342    1384    1426    1468    1512    1572    1651    1700    1723    1761
                         1807    1863    1919    1953    1998    2054    2094    2136    2176    2230    2238    2365    2415
                         2478    2512    2556    2573    2646    2662    2739    2760    2836    2856    2944    2948    2968
                         3044    3075    3128    3145    3159    3194    3223    3266    3295    3337    3366    3413    3449
                         3495    3524    3568    3597    3655    3689    3739    3758    3772    3821    3849    3893    3949
                         3994
C$BSUB= 000002             31#
C$CEFG= 000045             31#
C$CLCK= 000062             31#    863     865
C$CLEA= 000012             31#    807
C$CLOS= 000035             31#
C$CLP1= 000006             31#   1486    1523    1540    1829    1836    1885    1891    1964    1971    2187    2320    2431
                         2594    2618    2683    2708    2782    2806    2877    2902    2992    3017    3473    3542    3609
                         3626    3705
C$CVEC= 000036             31#    771     801     805     876    1574    1621    3099
C$DCLN= 000044             31#    964
C$DODU= 000051             31#    751     776     785     963
```

```
C$DRPT= 000024               31#
C$DU  = 000053               31#     817
C$EDIT= 000003               31#      40
C$ERDF= 000055               31#    1030    1181    1196    1256    1360    1404    1447    1490    1529    1544    1620    1673
                            1731    1779    1827    1834    1841    1883    1890    1896    1970    2033    2073    2115    2153
                            2193    2203    2289    2329    2387    2436    2490    2527    2531    2612    2702    2801    2897
                            3012    3098    3241    3315    3387    3471    3547    3615    3630    3706    3865    3928    3968
                            4015
C$ERHR= 000056               31#    3789
C$ERRO= 000060               31#
C$ERSF= 000054               31#    1319    3105
C$ERSO= 000057               31#
C$ESCA= 000010               31#    1216    1218    1223    1225    1228    1240    1243    1248    1250    1258    1302    1312
                            1354    1361    1396    1399    1438    1441    1478    1531    1664    1667    1715    1718    1733
                            1771    1780    1817    1822    1873    1878    1929    2015    2018    2065    2068    2106    2109
                            2146    2195    2243    2246    2267    2270    2273    2277    2280    2291    2301    2304    2314
                            2331    2378    2381    2389    2424    2487    2491    2524    2528    2532    2569    2572    2585
                            2590    2607    2659    2661    2675    2679    2697    2756    2759    2773    2778    2796    2852
                            2855    2868    2873    2892    2962    2983    2988    3007    3058    3060    3071    3073    3100
                            3142    3144    3155    3157    3169    3208    3210    3219    3221    3235    3242    3280    3282
                            3291    3293    3307    3310    3351    3353    3362    3364    3378    3381    3431    3433    3445
                            3447    3462    3465    3509    3511    3520    3522    3535    3582    3584    3593    3595    3617
                            3671    3674    3685    3687    3698    3703    3755    3757    3768    3770    3782    3830    3860
                            3866    3910    3913    3960    3963    4006    4009
C$ESEG= 000005               31#    1263    1323    1365    1408    1451    1494    1548    1623    1681    1738    1739    1789
                            1845    1900    1935    1975    2037    2077    2119    2158    2207    2343    2345    2396    2440
                            2492    2533    2622    2623    2715    2720    2814    2816    2913    2921    3025    3027    3028
                            3109    3110    3174    3175    3176    3246    3247    3319    3320    3391    3392    3475    3480
                            3551    3552    3634    3635    3708    3714    3794    3795    3805    3834    3870    3932    3972
                            4019
C$ESUB= 000003               31#
C$ETST= 000001               31#    1324    1366    1409    1452    1495    1549    1628    1682    1740    1790    1846    1901
                            1936    1976    2038    2078    2120    2159    2208    2346    2397    2441    2496    2536    2624
                            2721    2817    2922    3029    3112    3177    3248    3321    3393    3481    3553    3636    3715
                            3806    3835    3871    3933    3973    4020
C$EXIT= 000032               31#    1290    1340    1382    1424    1466    1510    1570    1646    1698    1756    1805    1860
                            1917    1951    1996    2052    2092    2134    2174    2228    2359    2413    2476    2493    2510
                            2554    2641    2737    2834    2942    3042    3126    3192    3264    3335    3411    3493    3566
                            3653    3731    3819    3847    3891    3947    3992
C$GETB= 000026               31#
C$GETW= 000027               31#
C$GMAN= 000043               31#
C$GPHR= 000042               31#     718
C$GPLO= 000030               31#
C$GPRI= 000040               31#
C$INIT= 000011               31#     760
C$INLP= 000020               31#     954
C$MANI= 000050               31#
C$MEM = 000031               31#
C$MSG = 000023               31#     440     449     459     470     481     491     503     511     524     535     546     557
                             568     578     589     598
C$OPEN= 000034               31#
C$PNTB= 000014               31#     454     465     476     486     500     519     530     541     552     563     573     584
                             595     600     603     604     605     606     609     610     774     782    1566    2616    2707
                            2805    2901    3016
C$PNTF= 000017               31#     748     749     961
```

```
C$PNTS= 000016       31#
C$PNTX= 000015       31#
C$QIO = 000377       31#
C$RDBU= 000007       31#    868
C$REFG= 000047       31#    694     698     700     708
C$RESE= 000033       31#
C$REVI= 000003       31#     40
C$RFLA= 000021       31#
C$RPT = 000025       31#
C$SEFG= 000046       31#
C$SPRI= 000041       31#    693     873     875    1350    1356    1514    1524    1576    1615    1960    1965    2178
                   2188    2232    2515    2523    3231    3237    3599    3610    3855    3859
C$SVEC= 000037       31#    759     768     797     871     905     910    1575    1622    3077
C$TPRI= 000013       31#
DAHS  = 000020       83#   2261
DATPAT  003236      312#   2643
DCKMES  003626      345#   1020
DEMES   003574      340#    998
DERFLG  002422      170#    996*
DERR  = 040000       58#    994    1305
DIAGMC= 000000       31
DLMT  = 000010      100#   4058
DLT   = 000000       96#   4053
DLTMES  003633      346#   1024
DMPCK = 000006       99#   4056
DMSG    034024     4053    4064#
DRBT  = 000010       91#   4034
DRDY  = 000001       55#   1174
DRIVE   002246      116#    600     728*    741     779    1046    1070    3083
DRMSG   033747     4034    4043#
DROP    012434      672#    956
DRPCOD  013562 G    812#
DRST  = 000010       77#   1212
DRTIM   003546      339#   1181
DRTYPE  033716     4031    4041#
DSPCOD  012446 G    681#
DS0   = 000000       64#
DS1   = 000400       65#
DS2   = 001000       66#
DS3   = 001400       67#
DWORD   002322      138#
EF.CON= 000036 G     54#    708
EF.NEW= 000035 G     54#
EF.PWR= 000034 G     54#    694
EF.RES= 000037 G     54#    698
EF.STA= 000040 G     54#    700
ELT   = 000002       97#   4055
EMSG    034131     4055    4067#
EM1     004467      369#    609
EM10    005064      375#   1490    1544    2153    2203
EM100   004522      370#    610     989
EM11    005124      376#   2289
EM12    005144      377#   2329
EM13    005176      378#
EM14    005224      379#   2387
EM16    005300      380#
```

```
EM17     005322            381#   1360
EM20     005346            382#   1404
EM21     005414            383#   1447
EM22     005461            384#   1673
EM23     005540            385#   2436
EM24     005616            386#   2490    2531
EM25     005656            387#   2612
EM26     005710            388#   1731
EM27     005734            389#   2897
EM30     006005            390#   1779
EM31     006040            391#   1827
EM32     006076            392#   1834
EM33     006135            393#   1841
EM34     006171            394#   1883
EM35     006227            395#   1890
EM36     006265            396#   1896
EM4      004712            371#   1970
EM40     006321            397#   3865
EM41     006361            398#
EM42     006417            399#
EM43     006461            400#   1529    2193
EM44     006522            401#   2527
EM45     006554            402#   2702
EM47     006604            403#   2801
EM5      004735            372#   2033
EM50     006621            404#   3012
EM53     006717            406#   3968
EM54     006764            407#   4015
EM55     006652            405#   3928
EM56     007033            408#   1620
EM57     007052            409#   3105
EM6      004763            373#   2073
EM60     007107            410#   3241
EM61     007137            411#   3315
EM62     007207            412#   3387
EM63     007246            413#   3471
EM64     007321            414#   3706
EM65     007364            415#   3547    3630
EM66     007421            416#   3615
EM7      005017            374#   2115
EM70     007472            417#   3789
END      013212            739     745     753#
ERCOUN   002426            172#    702     714
ERFLG    002400            161#   1211*   1260*   1290    1340    1382    1424    1466    1510    1570    1646    1698    1756
                          1805    1860    1917    1951    1996    2052    2092    2134    2174    2228    2359    2413    2476
                          2510    2554    2641    2737    2834    2942    3042    3126    3192    3264    3335    3411    3493
                          3566    3653    3731    3819    3847    3891    3947    3992
ERPOIN   002424            171#    714*    716*    958*    959
ERR    = 100000             57#
ERRVEC   002244            115#    768     771     797     805    3077    3099
ERR0     007510 G          432#   1256    1319    1360    1490    1529    1544    1827    1834    1883    1890    1970    2153
                          2193    2203    2436    2490    2527    2531    3105    3241    3547    3615    3630    3865
ERR1     007526 G          442#
ERR10    010146 G          537#   2702    2801
ERR11    010220 G          548#   3012
ERR12    010272 G          559#   2897
```

```
ERR13    010346 G       570#   1620
ERR14    010414 G       580#   3706
ERR15    010462 G       591#   3789
ERR2     007540 G       451#
ERR3     007602 G       461#
ERR4     007654 G       472#   1404    1447    1673    1779    1841    1896    2073    2115    2289    2329    2387    3315
                       3387    3471    3968    4015
ERR5     007722 G       483#   1181    1196    3098
ERR6     007760 G       493#   1030
ERR7     010022 G       505#
ERR8     010030 G       515#   1731    2612
ERR9     010102 G       526#   2033    3928
EVL    = 000004 G        54#
E$END  = 002100          31#
E$LOAD=  000035          31#     40
E.BA     002342         146#    605    1124*   1775    1839    1894    2069    3964
E.CS     002340         145#    605     986     990     994     999    1003    1007    1011    1016    1021    1123*   1480
                       1534    1818    1824    1831    1874    1880    1887    2148    2198    2315    2426    2488    2529
                       3537    3620
E.DA     002344         147#    606    1125*   1443    1669    2111    2383    3383    3467    4011
E.MP     002346         148#    606    1126*   1230    1252    1314    2247    2282
E.MP1    002350         149#    606    1127*
E.MP2    002352         150#    606    1128*
FIFTY    002654         184#    901*
FIRST    002312         134#
FIX      015352          992     997    1001    1005    1009    1013    1019    1023    1025    1027    1104#
FNDFNC   002372         158#   1054*   1055*   1057*   1060*
FRMT1    011052          600     618#
FRMT10   011652          573     630#
FRMT11   012001         632#    961
FRMT13   012111         635#
FRMT14   011476          584     628#
FRMT15   012142          595     636#
FRMT16   012167         637#    774
FRMT17   012233         638#    782
FRMT18   012316         639#   1566
FRMT2    011102          603     605     619#
FRMT2A   011121          604     620#
FRMT2B   011134          606     621#
FRMT3    011163          486     609     610     622#
FRMT4    011170          454     476     530     623#
FRMT5    011226          465     624#
FRMT6    011277          519     625#   2616
FRMT7    011354          541     626#   2707    2805
FRMT8    011426          552     627#   3016
FRMT9    011547          563     629#   2901
FRMT98   012044         633#    749
FRMT99   012106          500     634#    748
F$AU   = 000015          31#
F$AUTO=  000020          31#    766     787
F$BGN  = 000040          31#     38      42      53     103     108     324     328     427     429     432     442     451
                        461     472     483     493     505     515     526     537     548     559     570     580     591
                        647     650     656     667     669     679     681     685     691     692     761     766     794
                        795     808     812     813     818     826     916     926     934     945    1208    1216    1218
                       1223    1225    1228    1240    1243    1248    1250    1258    1267    1272    1290    1292    1302
                       1312    1324    1328    1340    1342    1354    1361    1366    1370    1382    1384    1396    1399
```

```
                    1409    1413    1424    1426    1438    1441    1452    1456    1466    1468    1478    1495    1499
                    1510    1512    1531    1549    1555    1570    1572    1628    1633    1646    1651    1664    1667
                    1682    1686    1698    1700    1715    1718    1723    1733    1740    1744    1756    1761    1771
                    1780    1790    1794    1805    1807    1817    1822    1846    1850    1860    1863    1873    1878
                    1901    1906    1917    1919    1929    1936    1940    1951    1953    1976    1980    1996    1998
                    2015    2018    2038    2042    2052    2054    2065    2068    2078    2082    2092    2094    2106
                    2109    2120    2124    2134    2136    2146    2159    2163    2174    2176    2195    2208    2212
                    2228    2230    2238    2243    2246    2267    2270    2273    2277    2280    2291    2301    2304
                    2314    2331    2346    2350    2359    2365    2378    2381    2389    2397    2409    2413    2415
                    2424    2441    2445    2476    2478    2487    2491    2493    2496    2500    2510    2512    2524
                    2528    2532    2536    2543    2554    2556    2569    2572    2573    2585    2590    2607    2624
                    2628    2641    2646    2659    2661    2662    2675    2679    2697    2721    2725    2737    2739
                    2756    2759    2760    2773    2778    2796    2817    2822    2834    2836    2852    2855    2856
                    2868    2873    2892    2922    2926    2942    2944    2948    2962    2968    2983    2988    3007
                    3029    3033    3042    3044    3058    3060    3071    3073    3075    3100    3112    3116    3126
                    3128    3142    3144    3145    3155    3157    3159    3169    3177    3181    3192    3194    3208
                    3210    3219    3221    3223    3235    3242    3248    3252    3264    3266    3280    3282    3291
                    3293    3295    3307    3310    3321    3325    3335    3337    3351    3353    3362    3364    3366
                    3378    3381    3393    3398    3411    3413    3431    3433    3445    3447    3449    3462    3465
                    3481    3484    3493    3495    3509    3511    3520    3522    3524    3535    3553    3557    3566
                    3568    3582    3584    3593    3595    3597    3617    3636    3641    3653    3655    3671    3674
                    3685    3687    3689    3698    3703    3715    3720    3731    3739    3755    3757    3758    3768
                    3770    3772    3782    3806    3815    3819    3821    3830    3835    3839    3847    3849    3860
                    3866    3871    3875    3891    3893    3910    3913    3933    3937    3947    3949    3960    3963
                    3973    3983    3992    3994    4006    4009    4020    4025    4027    4046    4049    4051    4069
F$CLEA= 000007       31#     795     807
F$DU  = 000016       31#     813     817
F$END = 000041       31#      38      42      53     103     108     324     328     427     429     440     449     459
                     470     481     491     503     511     524     535     546     557     568     578     589     598
                     647     656     667     669     679     681     685     691     760     761     787     794     807
                     808     812     817     818     826     921     932     942     951    1216    1218    1223    1225
                    1228    1240    1243    1248    1250    1258    1263    1267    1272    1290    1302    1312    1323
                    1324    1328    1340    1354    1361    1365    1366    1370    1382    1396    1399    1408    1409
                    1413    1424    1438    1441    1451    1452    1456    1466    1478    1494    1495    1499    1510
                    1531    1548    1549    1555    1570    1623    1628    1633    1646    1664    1667    1681    1682
                    1686    1698    1715    1718    1733    1739    1740    1744    1756    1771    1780    1789    1790
                    1794    1805    1817    1822    1845    1846    1850    1860    1873    1878    1900    1901    1906
                    1917    1929    1935    1936    1940    1951    1975    1976    1980    1996    2015    2018    2037
                    2038    2042    2052    2065    2068    2077    2078    2082    2092    2106    2109    2119    2120
                    2124    2134    2146    2158    2159    2163    2174    2195    2207    2208    2212    2228    2243
                    2246    2267    2270    2273    2277    2280    2291    2301    2304    2314    2331    2345    2346
                    2350    2359    2378    2381    2389    2396    2397    2409    2413    2424    2440    2441    2445
                    2476    2487    2491    2492    2493    2496    2500    2510    2524    2528    2532    2533    2536
                    2543    2554    2569    2572    2585    2590    2607    2623    2624    2628    2641    2659    2661
                    2675    2679    2697    2720    2721    2725    2737    2756    2759    2773    2778    2796    2816
                    2817    2822    2834    2852    2855    2868    2873    2892    2921    2922    2926    2942    2962
                    2983    2988    3007    3028    3029    3033    3042    3058    3060    3071    3073    3100    3110
                    3112    3116    3126    3142    3144    3155    3157    3169    3176    3177    3181    3192    3208
                    3210    3219    3221    3235    3242    3247    3248    3252    3264    3280    3282    3291    3293
                    3307    3310    3320    3321    3325    3335    3351    3353    3362    3364    3378    3381    3392
                    3393    3398    3411    3431    3433    3445    3447    3462    3465    3480    3481    3484    3493
                    3509    3511    3520    3522    3535    3552    3553    3557    3566    3582    3584    3593    3595
                    3617    3635    3636    3641    3653    3671    3674    3685    3687    3698    3703    3714    3715
                    3720    3731    3755    3757    3768    3770    3782    3805    3806    3815    3819    3830    3834
                    3835    3839    3847    3860    3866    3870    3871    3875    3891    3910    3913    3932    3933
                    3937    3947    3960    3963    3972    3973    3983    3992    4006    4009    4019    4020    4025
```

```
                              4036    4046    4049    4062    4069
F$HARD= 000004                 31#    4027    4036    4054    4057
F$HW  = 000013                 31#     657     666
F$INIT= 000006                 31#     692     760
F$JMP = 000050                 31#    1290    1340    1382    1424    1466    1510    1570    1646    1698    1756    1805    1860
                              1917    1951    1996    2052    2092    2134    2174    2228    2359    2413    2476    2493    2510
                              2554    2641    2737    2834    2942    3042    3126    3192    3264    3335    3411    3493    3566
                              3653    3731    3819    3847    3891    3947    3992
F$MOD = 000000                 31#      38      42      53     103     108     324     328     427     429     647     656     667
                               669     679     681     685     691     761     794     808     812     818     826    1267    4025
                              4046    4049    4069
F$MSG = 000011                 31#     432     440     442     449     451     459     461     470     472     481     483     491
                               493     503     505     511     515     524     526     535     537     546     548     557     559
                               568     570     578     580     589     591     598
F$PROT= 000021                 31#     650     654
F$PWR = 000017                 31#
F$RPT = 000012                 31#
F$SEG = 000003                 31#    1208    1263    1292    1323    1342    1365    1384    1408    1426    1451    1468    1494
                              1512    1548    1572    1623    1651    1681    1700    1723    1738    1739    1761    1789    1807
                              1845    1863    1900    1919    1935    1953    1975    1998    2037    2054    2077    2094    2119
                              2136    2158    2176    2207    2230    2238    2343    2345    2365    2396    2415    2440    2478
                              2492    2512    2533    2556    2573    2622    2623    2646    2662    2715    2720    2739    2760
                              2814    2816    2836    2856    2913    2921    2944    2948    2968    3025    3027    3028    3044
                              3075    3109    3110    3128    3145    3159    3174    3175    3176    3194    3223    3246    3247
                              3266    3295    3319    3320    3337    3366    3391    3392    3413    3449    3475    3480    3495
                              3524    3551    3552    3568    3597    3634    3635    3655    3689    3708    3714    3739    3758
                              3772    3794    3795    3805    3821    3834    3849    3870    3893    3932    3949    3972    3994
                              4019
F$SOFT= 000005                 31#    4051    4054    4057    4062
F$SRV = 000010                 31#     916     921     926     932     934     942     945     951
F$SUB = 000002                 31#
F$SW  = 000014                 31#     670     678
F$TEST= 000001                 31#    1272    1324    1328    1366    1370    1409    1413    1452    1456    1495    1499    1549
                              1555    1628    1633    1682    1686    1740    1744    1790    1794    1846    1850    1901    1906
                              1936    1940    1976    1980    2038    2042    2078    2082    2120    2124    2159    2163    2208
                              2212    2346    2350    2397    2409    2441    2445    2496    2500    2536    2543    2624    2628
                              2721    2725    2817    2822    2922    2926    3029    3033    3112    3116    3177    3181    3248
                              3252    3321    3325    3393    3398    3481    3484    3553    3557    3636    3641    3715    3720
                              3806    3815    3835    3839    3871    3875    3933    3937    3973    3983    4020
GDDAT   002300                129#     454     465     476     519     541     552     563    1314*   1315    1390*   1391*   1401
                              1429*   1430    1431*   1444    1654*   1655*   1656    1657*   1670    1725*   1727    1773*   1774*
                              1776    1838*   1893*   2010*   2059*   2060*   2070    2097*   2098    2099*   2112    2284*   2285*
                              2286    2325*   2326    2368*   2369*   2370    2371*   2384    2417*   2418    2600*   2602    2616
                              2687*   2692    2707    2786*   2791    2805    2810*   2885*   2887    2901    2909*   2998*   3002
                              3016    3082*   3083*   3084*   3086    3089    3301*   3302*   3312    3369*   3370    3371*   3384
                              3425*   3426*   3427    3437*   3438*   3439    3452*   3453*   3454    3455*   3468    3905*   3954*
                              3955*   3965    3997*   3998    3999*   4012
GLBDAT  002232 G              108#
GLBEQA  002232 G               53#
GLBERR  007510 G              429#
GLBSUB  013566 G              826#
GLBTXT  003430 G              328#
GODRVR= 000202                 76#
GSBIT = 000002                 78#    1212    1308
GSTAT = 000004                 70#    1214    1310
GSTINT  004221                360#    1085
```

```
GSTMES  004171              359#   1084
G$CNTO= 000200               31#
G$DELM= 000372               31#    834     839     852     856
G$DISP= 000003               31#
G$EXCP= 000400               31#
G$HILI= 000002               31#
G$LOLI= 000001               31#
G$NO  = 000000               31#
G$OFFS= 000400               31#   4029    4030    4031    4032    4033    4034    4053    4055    4056    4058
G$OFSI= 000376               31#   4029    4030    4031    4032    4033    4034    4053    4055    4056    4058
G$PRMA= 000001               31#   4030    4032
G$PRMD= 000002               31#   4033    4034    4055    4058
G$PRML= 000000               31#   4029    4031    4053    4056
G$RADA= 000140               31#
G$RADB= 000000               31#
G$RADD= 000040               31#   4055    4058
G$RADL= 000120               31#   4029    4031    4053    4056
G$RADO= 000020               31#   4030    4032    4033    4034
G$XFER= 000004               31#   4054    4057
G$YES = 000010               31#   4029    4030    4031    4032    4033    4034    4053    4055    4056    4058
HCRCME  003613              343#   1010
HDHOME  015766             1206#   1289    1339    1381    1423    1465    1509    1569    1645    1697    1755    1804    1859
                           1916    1950    1995    2051    2091    2133    2173    2227    2358    2412    2475    2509    2553
                           2640    2736    2833    2941    3041    3125    3191    3263    3334    3410    3492    3565    3652
                           3730    3818    3846    3890    3946    3991
HDREND  003046              249#   2336    3800
HDRLST  015312             1056    1080#
HDRTAB  002670              194#   2235    3735
HEND    003234              308#   2338    3802
HNFMES  003621              344#   1014
HOE   = 100000 G             54#
HPTCOD  012414 G            656#
HRDPRM  033602 G           4025#
HTAB    003050              250#   2237    3737
HZ      002650              182#    882*    883     885
IBE   = 010000 G             54#
IDU   = 000040 G             54#
IER   = 020000 G             54#
INITCO  012600 G            691#
INTEN = 000100               56#    800    1055    1062    1352    1521    1588    1962    2185    2521    3233    3607    3857
INTFLG  002256              120#    919*    929*   1345*   1357    1515*   1526    1577*   1593    1955*   1967    2179*   2190
                           2514*   2525    3226*   3238    3600*   3612    3851*   3862
INTSRV  014466              759     917#   1622
ISR   = 000100 G             54#
IXE   = 004000 G             54#
I$AU  = 000041               31#
I$AUTO='000041               31#    766#    787#
I$CLN = 000041               31#    795#    807#
I$DU  = 000041               31#    813#    817#
I$HRD = 000041             4027#   4036#
I$INIT= 000041               31#    692#    760#
I$MOD = 000041               31#     38#     42#     53#    103#    108#    324#    328#    427#    429#    647#    656#    667#
                            669#    679#    681#    685#    691#    761#    794#    808#    812#    818#    826#   1267#   4025#
                           4046#   4049#   4069#
I$MSG = 000041               31#    432#    440#    442#    449#    451#    459#    461#    470#    472#    481#    483#    491#
                            493#    503#    505#    511#    515#    524#    526#    535#    537#    546#    548#    557#    559#
```

```
                         568#    570#    578#    580#    589#    591#    598#
I$PROT= 000040            31#    650#
I$PTAB= 000041            31#
I$PWR = 000041            31#
I$RPT = 000041            31#
I$SEG = 000041            31#   1208#   1216    1218    1223    1225    1228    1240    1243    1248    1250    1258    1263#
                        1272    1292#   1302    1312    1323#   1328    1342#   1354    1361    1365#   1370    1384#   1396
                        1399    1408#   1413    1426#   1438    1441    1451#   1456    1468#   1478    1494#   1499    1512#
                        1531    1548#   1555    1572#   1623#   1633    1651#   1664    1667    1681#   1686    1700#   1715
                        1718    1723#   1733    1739#   1744    1761#   1771    1780    1789#   1794    1807#   1817    1822
                        1845#   1850    1863#   1873    1878    1900#   1906    1919#   1929    1935#   1940    1953#   1975#
                        1980    1998#   2015    2018    2037#   2042    2054#   2065    2068    2077#   2082    2094#   2106
                        2109    2119#   2124    2136#   2146    2158#   2163    2176#   2195    2207#   2212    2230#   2238#
                        2243    2246    2267    2270    2273    2277    2280    2291    2301    2304    2314    2331    2345#
                        2350    2365#   2378    2381    2389    2396#   2409    2415#   2424    2440#   2445    2478#   2487
                        2491    2492#   2500    2512#   2524    2528    2532    2533#   2543    2556#   2569    2572    2573#
                        2585    2590    2607    2623#   2628    2646#   2659    2661    2662#   2675    2679    2697    2720#
                        2725    2739#   2756    2759    2760#   2773    2778    2796    2816#   2822    2836#   2852    2855
                        2856#   2868    2873    2892    2921#   2926    2944#   2948#   2962    2968#   2983    2988    3007
                        3028#   3033    3044#   3058    3060    3071    3073    3075#   3100    3110#   3116    3128#   3142
                        3144    3145#   3155    3157    3159#   3169    3176#   3181    3194#   3208    3210    3219    3221
                        3223#   3235    3242    3247#   3252    3266#   3280    3282    3291    3293    3295#   3307    3310
                        3320#   3325    3337#   3351    3353    3362    3364    3366#   3378    3381    3392#   3398    3413#
                        3431    3433    3445    3447    3449#   3462    3465    3480#   3484    3495#   3509    3511    3520
                        3522    3524#   3535    3552#   3557    3568#   3582    3584    3593    3595    3597#   3617    3635#
                        3641    3655#   3671    3674    3685    3687    3689#   3698    3703    3714#   3720    3739#   3755
                        3757    3758#   3768    3770    3772#   3782    3805#   3815    3821#   3830    3834#   3839    3849#
                        3860    3866    3870#   3875    3893#   3910    3913    3932#   3937    3949#   3960    3963    3972#
                        3983    3994#   4006    4009    4019#
I$SETU= 000041            31#
I$SFT = 000041          4051#   4062#
I$SRV = 000041            31#    916#    921#    926#    932#    934#    942#    945#    951#
I$SUB = 000041            31#   1272    1328    1370    1413    1456    1499    1555    1633    1686    1744    1794    1850
                        1906    1940    1980    2042    2082    2124    2163    2212    2350    2409    2445    2500    2543
                        2628    2725    2822    2926    3033    3116    3181    3252    3325    3398    3484    3557    3641
                        3720    3815    3839    3875    3937    3983
I$TST = 000041            31#   1272#   1290    1324#   1328#   1340    1366#   1370#   1382    1409#   1413#   1424    1452#
                        1456#   1466    1495#   1499#   1510    1549#   1555#   1570    1628#   1633#   1646    1682#   1686#
                        1698    1740#   1744#   1756    1790#   1794#   1805    1846#   1850#   1860    1901#   1906#   1917
                        1936#   1940#   1951    1976#   1980#   1996    2038#   2042#   2052    2078#   2082#   2092    2120#
                        2124#   2134    2159#   2163#   2174    2208#   2212#   2228    2346#   2350#   2359    2397#   2409#
                        2413    2441#   2445#   2476    2493    2496#   2500#   2510    2536#   2543#   2554    2624#   2628#
                        2641    2721#   2725#   2737    2817#   2822#   2834    2922#   2926#   2942    3029#   3033#   3042
                        3112#   3116#   3126    3177#   3181#   3192    3248#   3252#   3264    3321#   3325#   3335    3393#
                        3398#   3411    3481#   3484#   3493    3553#   3557#   3566    3636#   3641#   3653    3715#   3720#
                        3731    3806#   3815#   3819    3835#   3839#   3847    3871#   3875#   3891    3933#   3937#   3947
                        3973#   3983#   3992    4020#
J$JMP = 000167            31#
LDCSR   002260           121#   1051*   1053*   1054    1062    1068*   1070*   1071*   1072
LDFUNC  015056          1041#   1213    1221    1237    1245    1298    1309    1351    1393    1435    1475    1520    1587
                        1661    1712    1768    1814    1870    1926    1961    2012    2062    2103    2143    2184    2240
                        2262    2274    2298    2311    2375    2421    2484    2520    2566    2582    2656    2672    2753
                        2770    2849    2865    2959    2980    3055    3068    3139    3152    3165    3205    3216    3232
                        3277    3288    3304    3348    3359    3375    3428    3442    3459    3506    3517    3532    3579
                        3590    3606    3668    3682    3695    3752    3765    3778    3827    3856    3907    3957    4003
LF      003640           347#   1030
```

```
LINE1    010522            434     444     453     463     474     485     495     517     528     539     550     561     572
                           582     593     600#    750     775     784     962
LINE2    010556            435     464     475     497     518     529     540     551     562     583     594     603#
LINE3    011000            496     609#
LMSG     034074           4058    4066#
LOE    = 040000 G           54#
LOPIMN   002404            163#    757
LOPIMX   002402            162#    758
LOT    = 000010 G           54#
L$ACP    002110 G           40#
L$APT    002036 G           40#
L$AUT    002070 G           40#
L$AUTO   013300 G           40     766#
L$CCP    002106 G           40#
L$CLEA   013466 G           40     795#
L$CO     002032 G           40#
L$DEPO   002011 G           40#
L$DESC   002122 G           40      44#
L$DESP   002076 G           40#
L$DEVP   002060 G           40#
L$DISP   012450 G           40     683#
L$DLY    002116 G           40#    829*    834     838*    839     844*    851*    852     856
L$DTP    002040 G           40#
L$DTYP   002034 G           40#
L$DU     013562 G           40     813#
L$DUT    002072 G           40#
L$DVTY   002220 G           40      46#
L$EF     002052 G           40#
L$ENVI   002044 G           40#
L$ETP    002102 G           40#
L$EXP1   002046 G           40#
L$EXP4   002064 G           40#
L$EXP5   002066 G           40#
L$HARD   033604 G           40    4027#
L$HIME   002120 G           40#   2456
L$HPCP   002016 G           40#
L$HPTP   002022 G           40#
L$HW     012416 G           40     657#
L$ICP    002104 G           40#
L$INIT   012600 G           40     692#
L$LADP   002026 G           40#
L$LAST   034152 G           40    4072#
L$LOAD   002100 G           40#
L$LUN    002074 G           40#
L$MREV   002050 G           40#
L$NAME   002000 G           40#
L$PRIO   002042 G           40#
L$PROT   012406 G           40     650#
L$PRT    002112 G           40#
L$REPP   002062 G           40#
L$REV    002010 G           40#
L$SOFT   033760 G           40    4051#
L$SPC    002056 G           40#
L$SPCP   002020 G           40#
L$SPTP   002024 G           40#
L$STA    002030 G           40#
```

```
L$SW     012434 G          40     670#
L$TEST   002114 G          40#
L$TIML   002014 G          40#
L$UNIT   002012 G          40#    696      713
L10000   007524           440#
L10001   007536           449#
L10002   007600           459#
L10003   007652           470#
L10004   007720           481#
L10005   007756           491#
L10006   010020           503#
L10007   010026           511#
L10010   010100           524#
L10011   010144           535#
L10012   010216           546#
L10013   010270           557#
L10014   010344           568#
L10015   010412           578#
L10016   010460           589#
L10017   010520           598#
L10021   012432           657     666#
L10022   012446           670     678#
L10023   013276           760#
L10024   013464           787#
L10025   013560           807#
L10026   013564           817#
L10027   014472           921#
L10030   014504           932#
L10031   014520           942#
L10032   014526           951#
L10033   016404          1290    1324#
L10034   016534          1340    1366#
L10035   016670          1382    1409#
L10036   017022          1424    1452#
L10037   017160          1466    1495#
L10040   017356          1510    1549#
L10041   020000          1570    1628#
L10042   020170          1646    1682#
L10043   020366          1698    1740#
L10044   020540          1756    1790#
L10045   020736          1805    1846#
L10046   021136          1860    1901#
L10047   021240          1917    1936#
L10050   021364          1951    1976#
L10051   021560          1996    2038#
L10052   021714          2052    2078#
L10053   022046          2092    2120#
L10054   022166          2134    2159#
L10055   022346          2174    2208#
L10056   023160          2228    2346#
L10057   023354          2359    2397#
L10060   023520          2413    2441#
L10061   023704          2476    2493     2496#
L10062   024070          2510    2536#
L10063   024470          2554    2624#
L10064   025112          2641    2721#
```

```
L10065  025540           2737    2817#
L10066  026220           2834    2922#
L10067  026652           2942    3029#
L10070  027266           3042    3112#
L10071  027520           3126    3177#
L10072  030010           3192    3248#
L10073  030304           3264    3321#
L10074  030576           3335    3393#
L10075  031170           3411    3481#
L10076  031470           3493    3553#
L10077  032030           3566    3636#
L10100  032342           3653    3715#
L10101  032666           3731    3806#
L10102  032756           3819    3835#
L10103  033110           3847    3871#
L10104  033306           3891    3933#
L10105  033444           3947    3973#
L10106  033600           3992    4020#
L10107  033664           4027    4036#
L10110  034024           4051    4062#
MAXCYL  002324            139#
MAXSEC  002320            137#
MDHEDR  002000 G           38#
MERLMT  012436            673#     959
MK    = 000001             79#    1212    1234    1308
MSCRLF  003642            348#    1026
MXSEC1  002316            136#
NOOPO = 000000             68#
NOPINT  003733            352#    1081
NOPMES  003705            351#    1080
NOPWR   012626            695      698#
NOTST   002662            187#    2453*   2494*   2507
NXM   = 020000             63#     999    1818    1874    2488    2529
NXMMES  003601            341#    1002
NXT     012676            710#     721     723     752
OPI   = 002000             59#    1003    3088
OPIERR  003653            350#
OPIMES  003606            342#    1006
OPIMN   002412            166#     573     753*    757*   1618
OPIMX   002414            167#     573     754*    758*   1616
OPITIM  002664            188#     891*    893*    898*    900*    937*   1581    1589    1591    1595*   1596*   1597    1609
                         1610
O$APTS= 000000             31#      40
O$AU  = 000000             31#      40
O$BGNR= 000000             31#      40
O$BGNS= 000001             31#      36#     40
O$DU  = 000001             31#      36#     40
O$ERRT= 000000             31#      40
O$GNSW= 000001             31#      36#     40
O$POIN= 000001             31#      36#     40
O$SETU= 000000             31#      40    4072
PCLKCS  002642            179#     863*    865*    879
PCLOCK  002660            186#     904*    911*   1583    1626*
PCSR    002644            180#     880*    930*    939*   1582
PNT   = 001000 G           54#
PRI   = 002000 G           54#
```

```
PRIOR  = 000004         89#   4033
PRI00  = 000000 G       54#   1350    1514    1576    1960    2178    2515    3231    3599    3855
PRI01  = 000040 G       54#
PRI02  = 000100 G       54#
PRI03  = 000140 G       54#
PRI04  = 000200 G       54#
PRI05  = 000240 G       54#    873
PRI06  = 000300 G       54#
PRI07  = 000340 G       54#    693     875    1356    1524    1615    1965    2188    2232    2523    3237    3610    3859
PWRFLG   002416        168#    696*    720     722*    738     802     804*
RDDINT   004271        362#   1093
RDDMES   004251        361#   1092
RDHDR  = 000010         72#   1222    1246    2241    2275
RDNHD  = 000016         75#   3828    3857    3908    3958    4004
RDNINT   004401        366#   1095
RDNMES   004353        365#   1094
READ   = 000014         74#   1927    1962    2013    2063    2104    2144    2185    2299    2312    2376    2422    2485
                      2521    2583    2673    2771    2866    2981    3069    3153    3217    3289    3360    3443    3518
                      3591    3683    3766
REST     012744        718#
RESTMS   015040        486    1028#   1066*
RHDINT   004103        356#   1089
RHDMES   004053        355#   1088
RHHS   = 000100         81#   2259
RLBA     002356        152#    733*   1115    1124    1297*   1348*   1388*   1400    1433*   1472*   1517*   1579*   1658*
                      1711*   1766*   1810*   1866*   1924*   1958*   2009*   2057*   2101*   2140*   2181*   2296*   2309*
                      2372*   2420*   2480*   2516*   2565*   2581*   2653*   2669*   2750*   2767*   2847*   2862*   2957*
                      2977*   3052*   3066*   3079*   3136*   3150*   3164*   3202*   3214*   3229*   3274*   3286*   3299*
                      3311    3345*   3357*   3373*   3423*   3440*   3456*   3503*   3515*   3529*   3576*   3588*   3603*
                      3666*   3678*   3690*   3749*   3763*   3777*   3825*   3853*   3904*   3952*   4001*
RLCS     002354        151#    600     731*    740*    741*    744     770     778*    779*    780     798     800*   1041
                      1047*   1048    1072*   1074*   1114    1123    1174    1188    1305    3089*   3091
RLDA     002360        153#    735*   1043    1044*   1050*   1116    1125    1212*   1234*   1235*   1295*   1308*   1346*
                      1387*   1430*   1471*   1516*   1578*   1656*   1709*   1765*   1813*   1869*   1922*   1956*   2007*
                      2056*   2098*   2139*   2180*   2250*   2255*   2258*   2261*   2293*   2294*   2306*   2307*   2370*
                      2418*   2482*   2518*   2563*   2579*   2654*   2671*   2752*   2769*   2848*   2864*   2958*   2976*
                      3054*   3065*   3080*   3138*   3149*   3162*   3204*   3213*   3227*   3276*   3285*   3298*   3347*
                      3356*   3370*   3427*   3439*   3454*   3505*   3514*   3528*   3578*   3587*   3602*   3667*   3677*
                      3694*   3751*   3762*   3775*   3826*   3854*   3902*   3951*   3998*
RLMP     002362        154#    737*   1117    1126    1127    1128    1296*   1347*   1389*   1432*   1473*   1518*   1580*
                      1659*   1710*   1764*   1812*   1868*   1923*   1957*   2008*   2058*   2100*   2141*   2182*   2295*
                      2308*   2373*   2419*   2483*   2519*   2564*   2580*   2655*   2670*   2751*   2768*   2846*   2863*
                      2956*   2979*   3053*   3067*   3081*   3137*   3151*   3163*   3203*   3215*   3228*   3275*   3287*
                      3300*   3346*   3358*   3372*   3424*   3441*   3457*   3504*   3516*   3530*   3577*   3589*   3604*
                      3665*   3681*   3693*   3750*   3764*   3776*   3824*   3852*   3903*   3953*   4000*
SECMSK   002262        122#   1253    2283    2285
SEEK   = 000006         71#   1238    2263
SEKINT   004150        358#   1087
SEKMES   004130        357#   1086
SETCLK   014062        862#   1563
SFTPRM   033756 G     4049#
SIGN   = 000004         80#   2255
SIMBCC   015464       1132#
SIXTY    002656        185#    894*   1598    1625*
SIZE   = 000004         98#
SKHOME   004430        367#   1256
```

```
SPTCOD  012432 G            669#
START   012704              707    712#
START1  012646              699    702#
STHS  = 000100               82#
SVCGBL= 000000               31#     38     40     44     46     53    108    328    429    432    442    451    461
                            472    483    493    505    515    526    537    548    559    570    580    591    650
                            656    657    669    670    681    683    691    692    766    794    795    812    813
                            826   4025   4027   4049   4051  4072#
SVCINS= 000000               31#    32#     40     44     46    440    449    454    459    465    470    476    481
                            486    491    500    503    511    519    524    530    535    541    546    552    557
                            563    568    573    578    584    589    595    598    600    603    604    605    606
                            609    610    657    670    683    693    694    695    698    699    700    701    708
                            709    718    719    748    749    751    759    760    768    771    774    776    782
                            785    787    797    801    805    807    817    834    839    852    856    863    864
                            865    866    868    869    871    873    875    876    905    910    921    932    942
                            951    954    955    961    963    964   1030   1181   1196   1208   1216   1218   1223
                           1225   1228   1240   1243   1248   1250   1256   1258   1263   1290   1292   1302   1312
                           1319   1323   1324   1340   1342   1350   1354   1356   1360   1361   1365   1366   1382
                           1384   1396   1399   1404   1408   1409   1424   1426   1438   1441   1447   1451   1452
                           1466   1468   1478   1486   1490   1494   1495   1510   1512   1514   1523   1524   1529
                           1531   1540   1544   1548   1549   1566   1570   1572   1574   1575   1576   1615   1620
                           1621   1622   1623   1628   1646   1651   1664   1667   1673   1681   1682   1698   1700
                           1715   1718   1723   1731   1733   1738   1739   1740   1756   1761   1771   1779   1780
                           1789   1790   1805   1807   1817   1822   1827   1829   1834   1836   1841   1845   1846
                           1860   1863   1873   1878   1883   1885   1890   1891   1896   1900   1901   1917   1919
                           1929   1935   1936   1951   1953   1960   1964   1965   1970   1971   1975   1976   1996
                           1998   2015   2018   2033   2037   2038   2052   2054   2065   2068   2073   2077   2078
                           2092   2094   2106   2109   2115   2119   2120   2134   2136   2146   2153   2158   2159
                           2174   2176   2178   2187   2188   2193   2195   2203   2207   2208   2228   2230   2232
                           2238   2243   2246   2267   2270   2273   2277   2280   2289   2291   2301   2304   2314
                           2320   2329   2331   2343   2345   2346   2359   2365   2378   2381   2387   2389   2396
                           2397   2413   2415   2424   2431   2436   2440   2441   2476   2478   2487   2490   2491
                           2492   2493   2496   2510   2512   2515   2523   2524   2527   2528   2531   2532   2533
                           2536   2554   2556   2569   2572   2573   2585   2590   2594   2607   2612   2616   2618
                           2622   2623   2624   2641   2646   2659   2661   2662   2675   2679   2683   2697   2702
                           2707   2708   2715   2720   2721   2737   2739   2756   2759   2760   2773   2778   2782
                           2796   2801   2805   2806   2814   2816   2817   2834   2836   2852   2855   2856   2868
                           2873   2877   2892   2897   2901   2902   2913   2921   2922   2942   2944   2948   2962
                           2968   2983   2988   2992   3007   3012   3016   3017   3025   3027   3028   3029   3042
                           3044   3058   3060   3071   3073   3075   3077   3098   3099   3100   3105   3109   3110
                           3112   3126   3128   3142   3144   3145   3155   3157   3159   3169   3174   3175   3176
                           3177   3192   3194   3208   3210   3219   3221   3223   3231   3235   3237   3241   3242
                           3246   3247   3248   3264   3266   3280   3282   3291   3293   3295   3307   3310   3315
                           3319   3320   3321   3335   3337   3351   3353   3362   3364   3366   3378   3381   3387
                           3391   3392   3393   3411   3413   3431   3433   3445   3447   3449   3462   3465   3471
                           3473   3475   3480   3481   3493   3495   3509   3511   3520   3522   3524   3535   3542
                           3547   3551   3552   3553   3566   3568   3582   3584   3593   3595   3597   3599   3609
                           3610   3615   3617   3626   3630   3634   3635   3636   3653   3655   3671   3674   3685
                           3687   3689   3698   3703   3705   3706   3708   3714   3715   3731   3739   3755   3757
                           3758   3768   3770   3772   3782   3789   3794   3795   3805   3806   3819   3821   3830
                           3834   3835   3847   3849   3855   3859   3860   3865   3866   3870   3871   3891   3893
                           3910   3913   3928   3932   3933   3947   3949   3960   3963   3968   3972   3973   3992
                           3994   4006   4009   4015   4019   4020   4027   4029   4030   4031   4032   4033   4034
                           4036   4051   4053   4054   4055   4056   4057   4058   4062   4072
SVCSUB= 177777               31#
SVCTAG= 000000               31#    33#    440    449    459    470    481    491    503    511    524    535    546
```

```
                            557     568     578     589     598     666     678     760     787     807     817     921     932
                            942     951    1263    1276    1286    1323    1324    1330    1336    1365    1366    1373    1378
                           1408    1409    1415    1420    1451    1452    1458    1463    1494    1495    1502    1506    1548
                           1549    1557    1561    1623    1628    1635    1641    1681    1682    1688    1694    1738    1739
                           1740    1746    1752    1789    1790    1796    1801    1845    1846    1852    1857    1900    1901
                           1908    1913    1935    1936    1942    1947    1975    1976    1982    1992    2037    2038    2044
                           2048    2077    2078    2084    2089    2119    2120    2126    2131    2158    2159    2166    2170
                           2207    2208    2214    2224    2343    2345    2346    2352    2355    2396    2397    2398    2404
                           2440    2441    2447    2451    2467    2472    2492    2496    2501    2504    2533    2536    2545
                           2550    2622    2623    2624    2632    2637    2715    2720    2721    2729    2733    2814    2816
                           2817    2826    2831    2913    2921    2922    2929    2938    3025    3027    3028    3029    3035
                           3038    3109    3110    3112    3118    3122    3174    3175    3176    3177    3183    3188    3246
                           3247    3248    3255    3260    3319    3320    3321    3327    3331    3391    3392    3393    3400
                           3406    3475    3480    3481    3486    3490    3551    3552    3553    3560    3562    3634    3635
                           3636    3645    3650    3708    3714    3715    3722    3727    3794    3795    3805    3806    3809
                           3814    3834    3835    3841    3844    3870    3871    3877    3887    3932    3933    3939    3943
                           3972    3973    3985    3989    4019    4020    4036    4062
SVCTST= 177777               31#   1272    1328    1370    1413    1456    1499    1555    1633    1686    1744    1794    1850
                           1906    1940    1980    2042    2082    2124    2163    2212    2350    2409    2445    2500    2543
                           2628    2725    2822    2926    3033    3116    3181    3252    3325    3398    3484    3557    3641
                           3720    3815    3839    3875    3937    3983
SVHD    002326              140#
S$LSYM= 010000               31#    440#    449#    459#    470#    481#    491#    503#    511#    524#    535#    546#    557#
                            568#    578#    589#    598#    666#    678#    760#    787#    807#    817#    921#    932#    942#
                            951#   1208#   1292#   1324#   1342#   1366#   1384#   1409#   1426#   1452#   1468#   1495#   1512#
                           1549#   1572#   1628#   1651#   1682#   1700#   1723#   1740#   1761#   1790#   1807#   1846#   1863#
                           1901#   1919#   1936#   1953#   1976#   1998#   2038#   2054#   2078#   2094#   2120#   2136#   2159#
                           2176#   2208#   2230#   2238#   2346#   2365#   2397#   2415#   2441#   2478#   2496#   2512#   2536#
                           2556#   2573#   2624#   2646#   2662#   2721#   2739#   2760#   2817#   2836#   2856#   2922#   2944#
                           2948#   2968#   3029#   3044#   3075#   3112#   3128#   3145#   3159#   3177#   3194#   3223#   3248#
                           3266#   3295#   3321#   3337#   3366#   3393#   3413#   3449#   3481#   3495#   3524#   3553#   3568#
                           3597#   3636#   3655#   3689#   3715#   3739#   3758#   3772#   3806#   3821#   3835#   3849#   3871#
                           3893#   3933#   3949#   3973#   3994#   4020#   4036#   4062#
TAG     002640              178#
TEMP    002634              176#
TEMPO   002632              175#
TEMP2   002304              131#   1135*   1158*
TEMP3   002306              132#   1136*   1140*
TEMP4   002310              133#   1137*   1139    1149*   1151    1156*   1157*   1161
TIME    013566              829#   1177    1191    3093
TIMSRV  014474              927#   1575
TIM.US  002636              177#    830*    845*
TMPO    002272              126#    465     530     552    1230*   1231*   1233*   1235    1252*   1253*   1480*   1481*   1482
                           1488    1534*   1535*   1536    1542    1648*   1655    1677*   1678    1921*   1933*   2000*   2004
                           2021    2030*   2148*   2149*   2150    2198*   2199*   2200    2315*   2316*   2317    2322    2362*
                           2369    2391*   2392    2946*   2952    2958    2963*   2964    2966*   2976    2998    3016    3021*
                           3022    3415*   3426    3438    3453    3477*   3478    3537*   3538*   3539    3544    3620*   3621*
                           3622    3628    3895*   3899    3916    3925*
TMP1    002274              127#    519     541     563     584    1649*   1654    1730*   1759*   1766    1773    1782*   1784*
                           2001*   2026    2029*   2247*   2249*   2253    2363*   2368    2604*   2616    2689*   2707    2711*
                           2712    2788*   2805    2809*   2811    2838*   2844    2880    2901    2915*   2916    3416*   3425
                           3437    3452    3657*   3663    3679    3691    3710*   3711    3896*   3921    3924*
TMP2    002276              128#   2251*   2252*   2253*   2257*   2258    2688*   2691    2710*   2787*   2790    2808*   2884*
                           2904*
TRPFLG  002254              119#    767*    772    1203*   3078*   3102
TRPHAN  015760              768     797    1203#   3077
```

```
TRYFNC  002376                160#     1067*
TYPDR = 000006                 90#     4031
T$ARGC= 000004                 40#      454#      465#      476#      486#      500#      519#      530#      541#      552#      563#      573#      584#
                              595#      600#      603#      604#      605#      606#      609#      610#      748#      749#      774#      782#      961#
                             1566#     2616#     2707#     2805#     2901#     3016#
T$CODE= 004052               4029#     4030#     4031K     4032#     4033#     4034#     4053#     4054#     4055#     4056#     4057#     4058#
T$ERRN= 000026                 31#     1030#     1181#     1196#     1256#     1319#     1360#     1404#     1447#     1490#     1529#     1544#     1620#
                             1673#     1731#     1779#     1827#     1834#     1841#     1883#     1890#     1896#     1970#     2033#     2073#     2115#
                             2153#     2193#     2203#     2289#     2329#     2387#     2436#     2490#     2527#     2531#     2612#     2702#     2801#
                             2897#     3012#     3098#     3105#     3241#     3315#     3387#     3471#     3547#     3615#     3630#     3706#     3789#
                             3865#     3928#     3968#     4015#
T$EXCP= 000000               4030#     4032#     4033#     4034#     4055#     4058#
T$FLAG= 000040               1216#     1218#     1223#     1225#     1228#     1240#     1243#     1248#     1250#     1258#     1290#     1302#     1312#
                             1340#     1354#     1361#     1382#     1396#     1399#     1424#     1438#     1441#     1466#     1478#     1510#     1531#
                             1570#     1646#     1664#     1667#     1698#     1715#     1718#     1733#     1756#     1771#     1780#     1805#     1817#
                             1822#     1860#     1873#     1878#     1917#     1929#     1951#     1996#     2015#     2018#     2052#     2065#     2068#
                             2092#     2106#     2109#     2134#     2146#     2174#     2195#     2228#     2243#     2246#     2267#     2270#     2273#
                             2277#     2280#     2291#     2301#     2304#     2314#     2331#     2359#     2378#     2381#     2389#     2413#     2424#
                             2476#     2487#     2491#     2493#     2510#     2524#     2528#     2532#     2554#     2569#     2572#     2585#     2590#
                             2607#     2641#     2659#     2661#     2675#     2679#     2697#     2737#     2756#     2759#     2773#     2778#     2796#
                             2834#     2852#     2855#     2868#     2873#     2892#     2942#     2962#     2983#     2988#     3007#     3042#     3058#
                             3060#     3071#     3073#     3100#     3126#     3142#     3144#     3155#     3157#     3169#     3192#     3208#     3210#
                             3219#     3221#     3235#     3242#     3264#     3280#     3282#     3291#     3293#     3307#     3310#     3335#     3351#
                             3353#     3362#     3364#     3378#     3381#     3411#     3431#     3433#     3445#     3447#     3462#     3465#     3493#
                             3509#     3511#     3520#     3522#     3535#     3566#     3582#     3584#     3593#     3595#     3617#     3653#     3671#
                             3674#     3685#     3687#     3698#     3703#     3731#     3755#     3757#     3768#     3770#     3782#     3819#     3830#
                             3847#     3860#     3866#     3891#     3910#     3913#     3947#     3960#     3963#     3992#     4006#     4009#
T$GMAN= 000000                 31#
T$HILI= 000200               4030#     4032#     4033#     4034#     4055#     4058#
T$LAST= 000001                 31#     4072#
T$LOLI= 000001               4030#     4032#     4033#     4034#     4055#     4058#
T$LSYM= 010000                 31#      440       449       459       470       481       491       503       511       524       535       546       557
                              568       578       589       598       666       678       760       787       807       817       921       932       942
                              951      1324      1366      1409      1452      1495      1549      1628      1682      1740      1790      1846      1901
                             1936      1976      2038      2078      2120      2159      2208      2346      2397      2441      2496      2536      2624
                             2721      2817      2922      3029      3112      3177      3248      3321      3393      3481      3553      3636      3715
                             3806      3835      3871      3933      3973      4020      4036      4062
T$LTNO= 000054               4072#
T$NEST= 177777                 31#       38#       42#       53#      103#      108#      324#      328#      427#      429#      432#      440#      442#
                              449#      451#      459#      461#      470#      472#      481#      483#      491#      493#      503#      505#      511#
                              515#      524#      526#      535#      537#      546#      548#      557#      559#      568#      570#      578#      580#
                              589#      591#      598#      647#      650#      654#      656#      657#      666#      667#      669#      670#      678#
                              679#      681#      685#      691#      692#      760#      761#      766#      787#      794#      795#      807#      808#
                              812#      813#      817#      818#      826#      916#      921#      926#      932#      934#      942#      945#      951#
                             1208#     1263#     1267#     1272#     1292#     1323#     1324#     1328#     1342#     1365#     1366#     1370#     1384#
                             1408#     1409#     1413#     1426#     1451#     1452#     1456#     1468#     1494#     1495#     1499#     1512#     1548#
                             1549#     1555#     1572#     1623#     1628#     1633#     1651#     1681#     1682#     1686#     1700#     1723#     1738#
                             1739#     1740#     1744#     1761#     1789#     1790#     1794#     1807#     1845#     1846#     1850#     1863#     1900#
                             1901#     1906#     1919#     1935#     1936#     1940#     1953#     1975#     1976#     1980#     1998#     2037#     2038#
                             2042#     2054#     2077#     2078#     2082#     2094#     2119#     2120#     2124#     2136#     2158#     2159#     2163#
                             2176#     2207#     2208#     2212#     2230#     2238#     2343#     2345#     2346#     2350#     2365#     2396#     2397#
                             2409#     2415#     2440#     2441#     2445#     2478#     2492#     2496#     2500#     2512#     2533#     2536#     2543#
                             2556#     2573#     2622#     2623#     2624#     2628#     2646#     2662#     2715#     2720#     2721#     2725#     2739#
                             2760#     2814#     2816#     2817#     2822#     2836#     2856#     2913#     2921#     2922#     2926#     2944#     2948#
                             2968#     3025#     3027#     3028#     3029#     3033#     3044#     3075#     3109#     3110#     3112#     3116#     3128#
                             3145#     3159#     3174#     3175#     3176#     3177#     3181#     3194#     3223#     3246#     3247#     3248#     3252#
```

```
                          3266#  3295#  3319#  3320#  3321#  3325#  3337#  3366#  3391#  3392#  3393#  3398#  3413#
                          3449#  3475#  3480#  3481#  3484#  3495#  3524#  3551#  3552#  3553#  3557#  3568#  3597#
                          3634#  3635#  3636#  3641#  3655#  3689#  3708#  3714#  3715#  3720#  3739#  3758#  3772#
                          3794#  3795#  3805#  3806#  3815#  3821#  3834#  3835#  3839#  3849#  3870#  3871#  3875#
                          3893#  3932#  3933#  3937#  3949#  3972#  3973#  3983#  3994#  4019#  4020#  4025#  4027#
                          4036#  4046#  4049#  4051#  4054   4057   4062#  4069#
T$NS0 = 000000              38#    42     53#   103    108#   324    328#   427    429#   647    650#   654    656#
                           667    669#   679    681#   685    691#   761    766#   787    794#   808    812#   818
                           826#  1267   1272#  1324   1328#  1366   1370#  1409   1413#  1452   1456#  1495   1499#
                          1549   1555#  1628   1633#  1682   1686#  1740   1744#  1790   1794#  1846   1850#  1901
                          1906#  1936   1940#  1976   1980#  2038   2042#  2078   2082#  2120   2124#  2159   2163#
                          2208   2212#  2346   2350#  2397   2409#  2441   2445#  2496   2500#  2536   2543#  2624
                          2628#  2721   2725#  2817   2822#  2922   2926#  3029   3033#  3112   3116#  3177   3181#
                          3248   3252#  3321   3325#  3393   3398#  3481   3484#  3553   3557#  3636   3641#  3715
                          3720#  3806   3815#  3835   3839#  3871   3875#  3933   3937#  3973   3983#  4020   4025#
                          4046   4049#  4069
T$NS1 = 000005             432#   440    442#   449    451#   459    461#   470    472#   481    483#   491    493#
                           503    505#   511    515#   524    526#   535    537#   546    548#   557    559#   568
                           570#   578    580#   589    591#   598    657#   666    670#   678    692#   760    795#
                           807    813#   817    916#   921    926#   932    934#   942    945#   951   1208#  1263
                          1292#  1323   1342#  1365   1384#  1408   1426#  1451   1468#  1494   1512#  1548   1572#
                          1623   1651#  1681   1700#  1739   1761#  1789   1807#  1845   1863#  1900   1919#  1935
                          1953#  1975   1998#  2037   2054#  2077   2094#  2119   2136#  2158   2176#  2207   2230#
                          2345   2365#  2396   2415#  2440   2478#  2492   2512#  2533   2556#  2623   2646#  2720
                          2739#  2816   2836#  2921   2944#  3028   3044#  3110   3128#  3176   3194#  3247   3266#
                          3320   3337#  3392   3413#  3480   3495#  3552   3568#  3635   3655#  3714   3739#  3805
                          3821#  3834   3849#  3870   3893#  3932   3949#  3972   3994#  4019   4027#  4036   4051#
                          4054   4057   4062
T$NS2 = 000003            1723#  1738   2238#  2343   2573#  2622   2662#  2715   2760#  2814   2856#  2913   2948#
                          3027   3075#  3109   3145#  3175   3223#  3246   3295#  3319   3366#  3391   3449#  3475
                          3524#  3551   3597#  3634   3689#  3708   3758#  3795
T$NS3 = 000003            2968#  3025   3159#  3174   3772#  3794
T$PTNU= 000000              31#
T$SAVL= 177777              31#
T$SEGL= 177777              31#  1208#  1216   1218   1223   1225   1228   1240   1243   1248   1250   1258   1263#
                          1292#  1302   1312   1323#  1342#  1354   1361   1365#  1384#  1396   1399   1408#  1426#
                          1438   1441   1451#  1468#  1478   1494#  1512#  1531   1548#  1572#  1623#  1651#  1664
                          1667   1681#  1700#  1715   1718   1723#  1733   1738#  1739#  1761#  1771   1780   1789#
                          1807#  1817   1822   1845#  1863#  1873   1878   1900#  1919#  1929   1935#  1953#  1975#
                          1998#  2015   2018   2037#  2054#  2065   2068   2077#  2094#  2106   2109   2119#  2136#
                          2146   2158#  2176#  2195   2207#  2230#  2238#  2243   2246   2267   2270   2273   2277
                          2280   2291   2301   2304   2314   2331   2343#  2345#  2365#  2378   2381   2389   2396#
                          2415#  2424   2440#  2478#  2487   2491   2492#  2512#  2524   2528   2532   2533#  2556#
                          2569   2572   2573#  2585   2590   2607   2622#  2623#  2646#  2659   2661   2662#  2675
                          2679   2697   2715#  2720#  2739#  2756   2759   2760#  2773   2778   2796   2814#  2816#
                          2836#  2852   2855   2856#  2868   2873   2892   2913#  2921#  2944#  2948#  2962   2968#
                          2983   2988   3007   3025#  3027#  3028#  3044#  3058   3060   3071   3073   3075#  3100
                          3109#  3110#  3128#  3142   3144   3145#  3155   3157   3159#  3169   3174#  3175#  3176#
                          3194#  3208   3210   3219   3221   3223#  3235   3242   3246#  3247#  3266#  3280   3282
                          3291   3293   3295#  3307   3310   3319#  3320#  3337#  3351   3353   3362   3364   3366#
                          3378   3381   3391#  3392#  3413#  3431   3433   3445   3447   3449#  3462   3465   3475#
                          3480#  3495#  3509   3511   3520   3522   3524#  3535   3551#  3552#  3568#  3582   3584
                          3593   3595   3597#  3617   3634#  3635#  3655#  3671   3674   3685   3687   3689#  3698
                          3703   3708#  3714#  3739#  3755   3757   3758#  3768   3770   3772#  3782   3794#  3795#
                          3805#  3821#  3830   3834#  3849#  3860   3866   3870#  3893#  3910   3913   3932#  3949#
                          3960   3963   3972#  3994#  4006   4009   4019#
```

```
T$SEK0= 010000          1208#   1216    1218    1223    1225    1228    1240    1243    1248    1250    1258    1263    1292#
                        1302    1312    1323    1342#   1354    1361    1365    1384#   1396    1399    1408    1426#   1438
                        1441    1451    1468#   1478    1494    1512#   1531    1548    1572#   1623    1651#   1664    1667
                        1681    1700#   1715    1718    1739    1761#   1771    1780    1789    1807#   1817    1822    1845
                        1863#   1873    1878    1900    1919#   1929    1935    1953#   1975    1998#   2015    2018    2037
                        2054#   2065    2068    2077    2094#   2106    2109    2119    2136#   2146    2158    2176#   2195
                        2207    2230#   2345    2365#   2378    2381    2389    2396    2415#   2424    2440    2478#   2487
                        2491    2492    2512#   2524    2528    2532    2533    2556#   2569    2572    2623    2646#   2659
                        2661    2720    2739#   2756    2759    2816    2836#   2852    2855    2921    2944#   3028    3044#
                        3058    3060    3071    3073    3110    3128#   3142    3144    3176    3194#   3208    3210    3219
                        3221    3247    3266#   3280    3282    3291    3293    3320    3337#   3351    3353    3362    3364
                        3392    3413#   3431    3433    3445    3447    3480    3495#   3509    3511    3520    3522    3552
                        3568#   3582    3584    3593    3595    3635    3655#   3671    3674    3685    3687    3714    3739#
                        3755    3757    3805    3821#   3830    3834    3849#   3860    3866    3870    3893#   3910    3913
                        3932    3949#   3960    3963    3972    3994#   4006    4009    4019
T$SEK1= 010001          1723#   1733    1738    2238#   2243    2246    2267    2270    2273    2277    2280    2291    2301
                        2304    2314    2331    2343    2573#   2585    2590    2607    2622    2662#   2675    2679    2697
                        2715    2760#   2773    2778    2796    2814    2856#   2868    2873    2892    2913    2948#   2962
                        3027    3075#   3100    3109    3145#   3155    3157    3175    3223#   3235    3242    3246    3295#
                        3307    3310    3319    3366#   3378    3381    3391    3449#   3462    3465    3475    3524#   3535
                        3551    3597#   3617    3634    3689#   3698    3703    3708    3758#   3768    3770    3795
T$SEK2= 010002          2968#   2983    2988    3007    3025    3159#   3169    3174    3772#   3782    3794
T$SUBN= 000000             31#   1272#   1328#   1370#   1413#   1456#   1499#   1555#   1633#   1686#   1744#   1794#   1850#
                         1906#   1940#   1980#   2042#   2082#   2124#   2163#   2212#   2350#   2409#   2445#   2500#   2543#
                         2628#   2725#   2822#   2926#   3033#   3116#   3181#   3252#   3325#   3398#   3484#   3557#   3641#
                         3720#   3815#   3839#   3875#   3937#   3983#
T$TAGL= 177777             31#
T$TAGN= 010111             31#    432#    442#    451#    461#    472#    483#    493#    505#    515#    526#    537#    548#
                          559#    570#    580#    591#    650#    657#    670#    692#    766#    795#    813#    916#    926#
                          934#    945#   1272#   1328#   1370#   1413#   1456#   1499#   1555#   1633#   1686#   1744#   1794#
                         1850#   1906#   1940#   1980#   2042#   2082#   2124#   2163#   2212#   2350#   2409#   2445#   2500#
                         2543#   2628#   2725#   2822#   2926#   3033#   3116#   3181#   3252#   3325#   3398#   3484#   3557#
                         3641#   3720#   3815#   3839#   3875#   3937#   3983#   4027#   4051#
T$TEMP= 000000             42#    103#    324#    427#    440#    449#    459#    470#    481#    491#    503#    511#    524#
                          535#    546#    557#    568#    578#    589#    598#    647#    654#    666#    667#    678#    679#
                          683#    685#    760#    761#    787#    807#    808#    817#    818#    921#    932#    942#    951#
                         1216#   1218#   1223#   1225#   1228#   1240#   1243#   1248#   1250#   1258#   1263#   1267#   1276#
                         1286#   1290#   1302#   1312#   1323#   1324#   1330#   1336#   1340#   1354#   1361#   1365#   1366#
                         1373#   1378#   1382#   1396#   1399#   1408#   1409#   1415#   1420#   1424#   1438#   1441#   1451#
                         1452#   1458#   1463#   1466#   1478#   1494#   1495#   1502#   1506#   1510#   1531#   1548#   1549#
                         1557#   1561#   1570#   1623#   1628#   1635#   1641#   1646#   1664#   1667#   1681#   1682#   1688#
                         1694#   1698#   1715#   1718#   1733#   1738#   1739#   1740#   1746#   1752#   1756#   1771#   1780#
                         1789#   1790#   1796#   1801#   1805#   1817#   1822#   1845#   1846#   1852#   1857#   1860#   1873#
                         1878#   1900#   1901#   1908#   1913#   1917#   1929#   1935#   1936#   1942#   1947#   1951#   1975#
                         1976#   1982#   1992#   1996#   2015#   2018#   2037#   2038#   2044#   2048#   2052#   2065#   2068#
                         2077#   2078#   2084#   2089#   2092#   2106#   2109#   2119#   2120#   2126#   2131#   2134#   2146#
                         2158#   2159#   2166#   2170#   2174#   2195#   2207#   2208#   2214#   2224#   2228#   2243#   2246#
                         2267#   2270#   2273#   2277#   2280#   2291#   2301#   2304#   2314#   2331#   2343#   2345#   2346#
                         2352#   2355#   2359#   2378#   2381#   2389#   2396#   2397#   2398#   2404#   2413#   2424#   2440#
                         2441#   2447#   2451#   2467#   2472#   2476#   2487#   2491#   2492#   2493#   2496#   2501#   2504#
                         2510#   2524#   2528#   2532#   2533#   2536#   2545#   2550#   2554#   2569#   2572#   2585#   2590#
                         2607#   2622#   2623#   2624#   2632#   2637#   2641#   2659#   2661#   2675#   2679#   2697#   2715#
                         2720#   2721#   2729#   2733#   2737#   2756#   2759#   2773#   2778#   2796#   2814#   2816#   2817#
                         2826#   2831#   2834#   2852#   2855#   2868#   2873#   2892#   2913#   2921#   2922#   2929#   2938#
                         2942#   2962#   2983#   2988#   3007#   3025#   3027#   3028#   3029#   3035#   3038#   3042#   3058#
                         3060#   3071#   3073#   3100#   3109#   3110#   3112#   3118#   3122#   3126#   3142#   3144#   3155#
                         3157#    3169#    3174#    3175#    3176#    3177#    3183#    3188#    3192#    3208#    3210#    3219#    3221#
                         3235#    3242#    3246#    3247#    3248#    3255#    3260#    3264#    3280#    3282#    3291#    3293#    3307#
                         3310#    3319#    3320#    3321#    3327#    3331#    3335#    3351#    3353#    3362#    3364#    3378#    3381#
                         3391#    3392#    3393#    3400#    3406#    3411#    3431#    3433#    3445#    3447#    3462#    3465#    3475#
                         3480#    3481#    3486#    3490#    3493#    3509#    3511#    3520#    3522#    3535#    3551#    3552#    3553#
                         3560#    3562#    3566#    3582#    3584#    3593#    3595#    3617#    3634#    3635#    3636#    3645#    3650#
                         3653#    3671#    3674#    3685#    3687#    3698#    3703#    3708#    3714#    3715#    3722#    3727#    3731#
                         3755#    3757#    3768#    3770#    3782#    3794#    3795#    3805#    3806#    3809#    3814#    3819#    3830#
                         3834#    3835#    3841#    3844#    3847#    3860#    3866#    3870#    3871#    3877#    3887#    3891#    3910#
                         3913#    3932#    3933#    3939#    3943#    3947#    3960#    3963#    3972#    3973#    3985#    3989#    3992#
                         4006#    4009#    4019#    4020#    4029#    4030#    4031#    4032#    4033#    4034#    4036#    4046#    4053#
                         4055#    4056#    4058#    4062#    4069#
T$TEST= 000054             31#    1272#    1328#    1370#    1413#    1456#    1499#    1555#    1633#    1686#    1744#    1794#    1850#
                         1906#    1940#    1980#    2042#    2082#    2124#    2163#    2212#    2350#    2409#    2445#    2500#    2543#
                         2628#    2725#    2822#    2926#    3033#    3116#    3181#    3252#    3325#    3398#    3484#    3557#    3641#
                         3720#    3815#    3839#    3875#    3937#    3983#    4072
T$TSTM= 177777             31#     440      449      454      459      465      470      476      481      486      491      500      503
                          511      519      524      530      535      541      546      552      557      563      568      573      578
                          584      589      595      598      600      603      604      605      606      609      610      693      694
                          698      700      708      718      748      749      751      759      760      768      771      774      776
                          782      785      787      797      801      805      807      817      863      865      868      871      873
                          875      876      905      910      954      961      963      964     1030     1181     1196     1208     1216
                         1218     1223     1225     1228     1240     1243     1248     1250     1256     1258     1263     1290     1292
                         1302     1312     1319     1323     1324     1340     1342     1350     1354     1356     1360     1361     1365
                         1366     1382     1384     1396     1399     1404     1408     1409     1424     1426     1438     1441     1447
                         1451     1452     1466     1468     1478     1486     1490     1494     1495     1510     1512     1514     1523
                         1524     1529     1531     1540     1544     1548     1549     1566     1570     1572     1574     1575     1576
                         1615     1620     1621     1622     1623     1628     1646     1651     1664     1667     1673     1681     1682
                         1698     1700     1715     1718     1723     1731     1733     1738     1739     1740     1756     1761     1771
                         1779     1780     1789     1790     1805     1807     1817     1822     1827     1829     1834     1836     1841
                         1845     1846     1860     1863     1873     1878     1883     1885     1890     1891     1896     1900     1901
                         1917     1919     1929     1935     1936     1951     1953     1960     1964     1965     1970     1971     1975
                         1976     1996     1998     2015     2018     2033     2037     2038     2052     2054     2065     2068     2073
                         2077     2078     2092     2094     2106     2109     2115     2119     2120     2134     2136     2146     2153
                         2158     2159     2174     2176     2178     2187     2188     2193     2195     2203     2207     2208     2228
                         2230     2232     2238     2243     2246     2267     2270     2273     2277     2280     2289     2291     2301
                         2304     2314     2320     2329     2331     2343     2345     2346     2359     2365     2378     2381     2387
                         2389     2396     2397     2413     2415     2424     2431     2436     2440     2441     2476     2478     2487
                         2490     2491     2492     2493     2496     2510     2512     2515     2523     2524     2527     2528     2531
                         2532     2533     2536     2554     2556     2569     2572     2573     2585     2590     2594     2607     2612
                         2616     2618     2622     2623     2624     2641     2646     2659     2661     2662     2675     2679     2683
                         2697     2702     2707     2708     2715     2720     2721     2737     2739     2756     2759     2760     2773
                         2778     2782     2796     2801     2805     2806     2814     2816     2817     2834     2836     2852     2855
                         2856     2868     2873     2877     2892     2897     2901     2902     2913     2921     2922     2942     2944
                         2948     2962     2968     2983     2988     2992     3007     3012     3016     3017     3025     3027     3028
                         3029     3042     3044     3058     3060     3071     3073     3075     3077     3098     3099     3100     3105
                         3109     3110     3112     3126     3128     3142     3144     3145     3155     3157     3159     3169     3174
                         3175     3176     3177     3192     3194     3208     3210     3219     3221     3223     3231     3235     3237
                         3241     3242     3246     3247     3248     3264     3266     3280     3282     3291     3293     3295     3307
                         3310     3315     3319     3320     3321     3335     3337     3351     3353     3362     3364     3366     3378
                         3381     3387     3391     3392     3393     3411     3413     3431     3433     3445     3447     3449     3462
                         3465     3471     3473     3475     3480     3481     3493     3495     3509     3511     3520     3522     3524
                         3535     3542     3547     3551     3552     3553     3566     3568     3582     3584     3593     3595     3597
                         3599     3609     3610     3615     3617     3626     3630     3634     3635     3636     3653     3655     3671
                         3674     3685     3687     3689     3698     3703     3705     3706     3708     3714     3715     3731     3739
                         3755     3757     3758     3768     3770     3772     3782     3789     3794     3795     3805     3806     3819
```

```
                  3821    3830    3834    3835    3847    3849    3855    3859    3860    3865    3866    3870    3871
                  3891    3893    3910    3913    3928    3932    3933    3947    3949    3960    3963    3968    3972
                  3973    3992    3994    4006    4009    4015    4019    4020
T$TSTS= 000001      31#   1272#   1328#   1370#   1413#   1456#   1499#   1555#   1633#   1686#   1744#   1794#   1850#
                  1906#   1940#   1980#   2042#   2082#   2124#   2163#   2212#   2350#   2409#   2445#   2500#   2543#
                  2628#   2725#   2822#   2926#   3033#   3116#   3181#   3252#   3325#   3398#   3484#   3557#   3641#
                  3720#   3815#   3839#   3875#   3937#   3983#
T$$AUT= 010024     766#    787
T$$CLE= 010025     795#    807
T$$DU = 010026     813#    817
T$$HAR= 010107    4027#   4036
T$$HW = 010021     657#    666
T$$INI= 010023     692#    760
T$$MSG= 010017     432#    440     442#    449     451#    459     461#    470     472#    481     483#    491     493#
                   503     505#    511     515#    524     526#    535     537#    546     548#    557     559#    568
                   570#    578     580#    589     591#    598
T$$PRO= 010020     650#
T$$SEG= 010000    1208#   1216    1218    1223    1225    1228    1240    1243    1248    1250    1258    1263#   1292#
                  1302    1312    1323#   1342#   1354    1361    1365#   1384#   1396    1399    1408#   1426#   1438
                  1441    1451#   1468#   1478    1494#   1512#   1531    1548#   1572#   1623#   1651#   1664    1667
                  1681#   1700#   1715    1718    1723#   1733    1738#   1739#   1761#   1771    1780    1789#   1807#
                  1817    1822    1845#   1863#   1873    1878    1900#   1919#   1929    1935#   1953#   1975#   1998#
                  2015    2018    2037#   2054#   2065    2068    2077#   2094#   2106    2109    2119#   2136#   2146
                  2158#   2176#   2195    2207#   2230#   2238#   2243    2246    2267    2270    2273    2277    2280
                  2291    2301    2304    2314    2331    2343#   2345#   2365#   2378    2381    2389    2396#   2415#
                  2424    2440#   2478#   2487    2491    2492#   2512#   2524    2528    2532    2533#   2556#   2569
                  2572    2573#   2585    2590    2607    2622#   2623#   2646#   2659    2661    2662#   2675    2679
                  2697    2715#   2720#   2739#   2756    2759    2760#   2773    2778    2796    2814#   2816#   2836#
                  2852    2855    2856#   2868    2873    2892    2913#   2921#   2944#   2948#   2962    2968#   2983
                  2988    3007    3025#   3027#   3028#   3044#   3058    3060    3071    3073    3075#   3100    3109#
                  3110#   3128#   3142    3144    3145#   3155    3157    3159#   3169    3174#   3175#   3176#   3194#
                  3208    3210    3219    3221    3223#   3235    3242    3246#   3247#   3266#   3280    3282    3291
                  3293    3295#   3307    3310    3319#   3320#   3337#   3351    3353    3362    3364    3366#   3378
                  3381    3391#   3392#   3413#   3431    3433    3445    3447    3449#   3462    3465    3475#   3480#
                  3495#   3509    3511    3520    3522    3524#   3535    3551#   3552#   3568#   3582    3584    3593
                  3595    3597#   3617    3634#   3635#   3655#   3671    3674    3685    3687    3689#   3698    3703
                  3708#   3714#   3739#   3755    3757    3758#   3768    3770    3772#   3782    3794#   3795#   3805#
                  3821#   3830    3834#   3849#   3860    3866    3870#   3893#   3910    3913    3932#   3949#   3960
                  3963    3972#   3994#   4006    4009    4019#
T$$SOF= 010110    4051#   4062
T$$SRV= 010032     916#    921     926#    932     934#    942     945#    951
T$$SW = 010022     670#    678
T$$TES= 010106    1272#   1290    1324    1328#   1340    1366    1370#   1382    1409    1413#   1424    1452    1456#
                  1466    1495    1499#   1510    1549    1555#   1570    1628    1633#   1646    1682    1686#   1698
                  1740    1744#   1756    1790    1794#   1805    1846    1850#   1860    1901    1906#   1917    1936
                  1940#   1951    1976    1980#   1996    2038    2042#   2052    2078    2082#   2092    2120    2124#
                  2134    2159    2163#   2174    2208    2212#   2228    2346    2350#   2359    2397    2409#   2413
                  2441    2445#   2476    2493    2496    2500#   2510    2536    2543#   2554    2624    2628#   2641
                  2721    2725#   2737    2817    2822#   2834    2922    2926#   2942    3029    3033#   3042    3112
                  3116#   3126    3177    3181#   3192    3248    3252#   3264    3321    3325#   3335    3393    3398#
                  3411    3481    3484#   3493    3553    3557#   3566    3636    3641#   3653    3715    3720#   3731
                  3806    3815#   3819    3835    3839#   3847    3871    3875#   3891    3933    3937#   3947    3973
                  3983#   3992    4020
T.ANS     012444   676#
T.CNTL    002420   169#    729*    755     832     849     889     896    2454
T.CRC     002236   112#    985*   1018*   2588    2677    2776    2871    2986    3701    3786
```

```
T.DMP    012440             674#    2592     2681     2780     2875     2990
T.DRIV   002232             110#     727*    2233     2334     3733     3798
T.LMT    012442             675#    2605     2695     2794     2890     3005
T1       016242 G           683     1272#
T10      020370 G           683     1744#
T11      020542 G           683     1794#
T12      020740 G           683     1850#
T13      021140 G           683     1906#
T14      021242 G           683     1940#
T15      021366 G           683     1980#
T16      021562 G           683     2042#
T17      021716 G           683     2082#
T18      022050 G           683     2124#
T19      022170 G           683     2163#
T2       016406 G           683     1328#
T20      022350 G           683     2212#
T21      023162 G           683     2350#
T22      023356 G           683     2409#
T23      023522 G           683     2445#
T24      023706 G           683     2500#
T25      024072 G           683     2543#
T26      024472 G           683     2628#
T27      025114 G           683     2725#
T28      025542 G           683     2822#
T29      026222 G           683     2926#
T3       016536 G           683     1370#
T30      026654 G           683     3033#
T31      027270 G           683     3116#
T32      027522 G           683     3181#
T33      030012 G           683     3252#
T34      030306 G           683     3325#
T35      030600 G           683     3398#
T36      031172 G           683     3484#
T37      031472 G           683     3557#
T38      032032 G           683     3641#
T39      032344 G           683     3720#
T4       016672 G           683     1413#
T40      032670 G           683     3815#
T41      032760 G           683     3839#
T42      033112 G           683     3875#
T43      033310 G           683     3937#
T44      033446 G           683     3983#
T5       017024 G           683     1456#
T6       017162 G           683     1499#
T7       017360 G           683     1555#
T8       020002 G           683     1633#
T9       020172 G           683     1686#
UAM    = 000200 G            54#
UNITST   002252             118#     712*     715*     718      751      776      785      963
UOPIMN   002410             165#     753
UOPIMX   002406             164#     754
UUT      002250             117#     710      713*     717*
VEC      002646             181#     881*     902      905      907      910
VECMSG   033740            4032     4042#
VECT   = 000002              88#    4032
WCKINT   004016             354#    1083
```

```
WCKMES   003762     353#   1082
WHY      002240     113#
WRCHK  = 000002      69#   3084    3166    3233    3305    3376    3460    3533    3607    3696    3779
WRITE  = 000012      73#   1299    1352    1394    1436    1476    1521    1588    1662    1713    1769    1815    1871
                   2567    2657    2754    2850    2960    3056    3140    3206    3278    3349    3429    3507    3580
                   3669    3753
WRLOCK   004452     368#   1319
WRTINT   004332     364#   1091
WRTMES   004311     363#   1090
WTCRDY   015702    1187#   1215    1224    1239    1247    1301    1311    1353    1395    1437    1477    1522    1663
                   1714    1770    1816    1872    1928    1963    2014    2064    2105    2145    2186    2242    2266
                   2276    2300    2313    2377    2423    2486    2522    2568    2584    2658    2674    2755    2772
                   2851    2867    2961    2982    3057    3070    3141    3154    3168    3207    3218    3234    3279
                   3290    3306    3350    3361    3377    3430    3444    3461    3508    3519    3534    3581    3592
                   3608    3670    3684    3697    3754    3767    3781    3829    3858    3909    3959    4005
WTDRDY   015636    1173#   2272
XDELAY   002626     173#    831*    835*    840*   1177*   1191*   3093*
XITFLG   002652     183#    887*   1564    1624*
XMEM     002374     159#   1068    1069*   1811*   1867*   2481*   2517*
XPOLY    002264     123#   1145    1156
XTIME    013720     743     844#    874
XXX      012726     711     715#
X$ALWA=  000000      31#
X$FALS=  000040      31#   4054    4057
X$OFFS=  000400      31#   4054    4057
X$TRUE=  000020      31#
YDELAY   002630     174#    743*    846*    847*    848*    853*    857*    874*
.      = 034152       6#    172#    370#    834     839     852     856    1216    1218    1223    1225    1228    1240
                   1243    1248    1250    1258    1290    1302    1312    1340    1354    1361    1382    1396    1399
                   1424    1438    1441    1466    1478    1510    1531    1570    1646    1664    1667    1698    1715
                   1718    1733    1756    1771    1780    1805    1817    1822    1860    1873    1878    1917    1929
                   1951    1996    2015    2018    2052    2065    2068    2092    2106    2109    2134    2146    2174
                   2195    2228    2243    2246    2267    2270    2273    2277    2280    2291    2301    2304    2314
                   2331    2359    2378    2381    2389    2413    2424    2476    2487    2491    2493    2510    2524
                   2528    2532    2554    2569    2572    2585    2590    2607    2641    2659    2661    2675    2679
                   2697    2737    2756    2759    2773    2778    2796    2834    2852    2855    2868    2873    2892
                   2942    2962    2983    2988    3007    3042    3058    3060    3071    3073    3100    3126    3142
                   3144    3155    3157    3169    3192    3208    3210    3219    3221    3235    3242    3264    3280
                   3282    3291    3293    3307    3310    3335    3351    3353    3362    3364    3378    3381    3411
                   3431    3433    3445    3447    3462    3465    3493    3509    3511    3520    3522    3535    3566
                   3582    3584    3593    3595    3617    3653    3671    3674    3685    3687    3698    3703    3731
                   3755    3757    3768    3770    3782    3819    3830    3847    3860    3866    3891    3910    3913
                   3947    3960    3963    3992    4006    4009    4044#   4054    4057    4072#
```

```
BCOMPL    699     709     719     864     866     955
BGNAUT    766
BGNCLN    795
BGNDU     813
BGNHRD   4027
BGNHW     657
BGNINI    692
BGNMOD     38      53     108     328     429     656     669     681     691     794     812     826    4025    4049
BGNMSG    432     442     451     461     472     483     493     505     515     526     537     548     559     570     580
          591
BGNPRO    650
BGNSEG   1208    1292    1342    1384    1426    1468    1512    1572    1651    1700    1723    1761    1807    1863    1919
         1953    1998    2054    2094    2136    2176    2230    2238    2365    2415    2478    2512    2556    2573    2646
         2662    2739    2760    2836    2856    2944    2948    2968    3044    3075    3128    3145    3159    3194    3223
         3266    3295    3337    3365    3413    3449    3495    3524    3568    3597    3655    3689    3739    3758    3772
         3821    3849    3893    3949    3994
BGNSFT   4051
BGNSRV    916     926     934     945
BGNSW     670
BGNTST   1272    1328    1370    1413    1456    1499    1555    1633    1686    1744    1794    1850    1906    1940    1980
         2042    2082    2124    2163    2212    2350    2409    2445    2500    2543    2628    2725    2822    2926    3033
         3116    3181    3252    3325    3398    3484    3557    3641    3720    3815    3839    3875    3937    3983
BNCOMP    695     701     869
CKERFG    10#    1290    1340    1382    1424    1466    1510    1570    1646    1698    1756    1805    1860    1917    1951
         1996    2052    2092    2134    2174    2228    2359    2413    2476    2510    2554    2641    2737    2834    2942
         3042    3126    3192    3264    3335    3411    3493    3566    3653    3731    3819    3847    3891    3947    3992
CKLOOP   1486    1523    1540    1829    1836    1885    1891    1964    1971    2187    2320    2431    2594    2618    2683
         2708    2782    2806    2877    2902    2992    3017    3473    3542    3609    3626    3705
CLOCK     863     865
CLRVEC    771     801     805     876    1574    1621    3099
DELAY     834     839     852     856
DESCRI     44
DEVTYP     46
DISPAT    683
DOCLN     964
DODU      751     776     785     963
ENDAUT    787
ENDCLN    807
ENDDU     817
ENDHRD   4036
ENDHW     666
ENDINI    760
ENDMOD     42     103     324     427     647     667     679     685     761     808     818    1267    4046    4069
ENDMSG    440     449     459     470     481     491     503     511     524     535     546     557     568     578     589
          598
ENDPRO    654
ENDSEG   1263    1323    1365    1408    1451    1494    1548    1623    1681    1738    1739    1789    1845    1900    1935
         1975    2037    2077    2119    2158    2207    2343    2345    2396    2440    2492    2533    2622    2623    2715
         2720    2814    2816    2913    2921    3025    3027    3028    3109    3110    3174    3175    3176    3246    3247
         3319    3320    3391    3392    3475    3480    3551    3552    3634    3635    3708    3714    3794    3795    3805
         3834    3870    3932    3972    4019
ENDSFT   4062
ENDSRV    921     932     942     951
ENDSW     678
ENDTST   1324    1366    1409    1452    1495    1549    1628    1682    1740    1790    1846    1901    1936    1976    2038
         2078    2120    2159    2208    2346    2397    2441    2496    2536    2624    2721    2817    2922    3029    3112
```

```
            3177     3248     3321     3393     3481     3553     3636     3715     3806     3835     3871     3933     3973     4020
EQUALS        54
ERRDF       1030     1181     1196     1256     1360     1404     1447     1490     1529     1544     1620     1673     1731     1779     1827
            1834     1841     1883     1890     1896     1970     2033     2073     2115     2153     2193     2203     2289     2329     2387
            2436     2490     2527     2531     2612     2702     2801     2897     3012     3098     3241     3315     3387     3471     3547
            3615     3630     3706     3865     3928     3968     4015
ERRHRD      3789
ERRSF       1319     3105
ESCAPE      1216     1218     1223     1225     1228     1240     1243     1248     1250     1258     1302     1312     1354     1361     1396
            1399     1438     1441     1478     1531     1664     1667     1715     1718     1733     1771     1780     1817     1822     1873
            1878     1929     2015     2018     2065     2068     2106     2109     2146     2195     2243     2246     2267     2270     2273
            2277     2280     2291     2301     2304     2314     2331     2378     2381     2389     2424     2487     2491     2524     2528
            2532     2569     2572     2585     2590     2607     2659     2661     2675     2679     2697     2756     2759     2773     2778
            2796     2852     2855     2868     2873     2892     2962     2983     2988     3007     3058     3060     3071     3073     3100
            3142     3144     3155     3157     3169     3208     3210     3219     3221     3235     3242     3280     3282     3291     3293
            3307     3310     3351     3353     3362     3364     3378     3381     3431     3433     3445     3447     3462     3465     3509
            3511     3520     3522     3535     3582     3584     3593     3595     3617     3671     3674     3685     3687     3698     3703
            3755     3757     3768     3770     3782     3830     3860     3866     3910     3913     3960     3963     4006     4009
EXIT        1290     1340     1382     1424     1466     1510     1570     1646     1698     1756     1805     1860     1917     1951     1996
            2052     2092     2134     2174     2228     2359     2413     2476     2493     2510     2554     2641     2737     2834     2942
            3042     3126     3192     3264     3335     3411     3493     3566     3653     3731     3819     3847     3891     3947     3992
GPHARD       718
GPRMA       4030     4032
GPRMD       4033     4034     4055     4058
GPRML       4029     4031     4053     4056
HEADER        40
INLOOP       954
LASTAD      4072
M$BYTE        40#
M$CHEC      1290#    1340#    1382#    1424#    1466#    1510#    1570#    1646#    1698#    1756#    1805#    1860#    1917#    1951#    1996#
            2052#    2092#    2134#    2174#    2228#    2359#    2413#    2476#    2493#    2510#    2554#    2641#    2737#    2834#    2942#
            3042#    3126#    3192#    3264#    3335#    3411#    3493#    3566#    3653#    3731#    3819#    3847#    3891#    3947#    3992#
M$CNTO      4029#    4030#    4031#    4032#    4033#    4034#    4053#    4055#    4056#    4058#
M$COUN       454#     465#     476#     486#     500#     519#     530#     541#     552#     563#     573#     584#     595#     600#     603#
             604#     605#     606#     609#     610#     748#     749#     774#     782#     961#    1566#    2616#    2707#    2805#    2901#
            3016#
M$DATA        40#      44#      46#
M$DECR        42#     103#     324#     427#     440#     449#     459#     470#     481#     491#     503#     511#     524#     535#     546#
             557#     568#     578#     589#     598#     647#     654#     666#     667#     678#     679#     685#     760#     761#     787#
             807#     808#     817#     818#     921#     932#     942#     951#    1263#    1267#    1323#    1324#    1365#    1366#    1408#
            1409#    1451#    1452#    1494#    1495#    1548#    1549#    1623#    1628#    1681#    1682#    1738#    1739#    1740#    1789#
            1790#    1845#    1846#    1900#    1901#    1935#    1936#    1975#    1976#    2037#    2038#    2077#    2078#    2119#    2120#
            2158#    2159#    2207#    2208#    2343#    2345#    2346#    2396#    2397#    2440#    2441#    2492#    2496#    2533#    2536#
            2622#    2623#    2624#    2715#    2720#    2721#    2814#    2816#    2817#    2913#    2921#    2922#    3025#    3027#    3028#
            3029#    3109#    3110#    3112#    3174#    3175#    3176#    3177#    3246#    3247#    3248#    3319#    3320#    3321#    3391#
            3392#    3393#    3475#    3480#    3481#    3551#    3552#    3553#    3634#    3635#    3636#    3708#    3714#    3715#    3794#
            3795#    3805#    3806#    3834#    3835#    3870#    3871#    3932#    3933#    3972#    3973#    4019#    4020#    4036#    4046#
            4062#    4069#
M$DEFA      4029#    4030#    4031#    4032#    4033#    4034#    4053#    4055#    4056#    4058#
M$ENDE        42#     103#     324#     427#     440#     449#     459#     470#     481#     491#     503#     511#     524#     535#     546#
             557#     568#     578#     589#     598#     647#     666#     667#     678#     679#     685#     760#     761#     787#     807#
             808#     817#     818#     921#     932#     942#     951#    1263#    1267#    1323#    1324#    1365#    1366#    1408#    1409#
            1451#    1452#    1494#    1495#    1548#    1549#    1623#    1628#    1681#    1682#    1738#    1739#    1740#    1789#    1790#
            1845#    1846#    1900#    1901#    1935#    1936#    1975#    1976#    2037#    2038#    2077#    2078#    2119#    2120#    2158#
            2159#    2207#    2208#    2343#    2345#    2346#    2396#    2397#    2440#    2441#    2492#    2496#    2533#    2536#    2622#
            2623#    2624#    2715#    2720#    2721#    2814#    2816#    2817#    2913#    2921#    2922#    3025#    3027#    3028#    3029#
            3109#   3110#   3112#   3174#   3175#   3176#   3177#   3246#   3247#   3248#   3319#   3320#   3321#   3391#   3392#
            3393#   3475#   3480#   3481#   3551#   3552#   3553#   3634#   3635#   3636#   3708#   3714#   3715#   3794#   3795#
            3805#   3806#   3834#   3835#   3870#   3871#   3932#   3933#   3972#   3973#   4019#   4020#   4036#   4046#   4062#
            4069#
M$ERRI      1030#   1181#   1196#   1256#   1319#   1360#   1404#   1447#   1490#   1529#   1544#   1620#   1673#   1731#   1779#
            1827#   1834#   1841#   1883#   1890#   1896#   1970#   2033#   2073#   2115#   2153#   2193#   2203#   2289#   2329#
            2387#   2436#   2490#   2527#   2531#   2612#   2702#   2801#   2897#   3012#   3098#   3105#   3241#   3315#   3387#
            3471#   3547#   3615#   3630#   3706#   3789#   3865#   3928#   3968#   4015#
M$ESCA      1216#   1218#   1223#   1225#   1228#   1240#   1243#   1248#   1250#   1258#   1302#   1312#   1354#   1361#   1396#
            1399#   1438#   1441#   1478#   1531#   1664#   1667#   1715#   1718#   1733#   1771#   1780#   1817#   1822#   1873#
            1878#   1929#   2015#   2018#   2065#   2068#   2106#   2109#   2146#   2195#   2243#   2246#   2267#   2270#   2273#
            2277#   2280#   2291#   2301#   2304#   2314#   2331#   2378#   2381#   2389#   2424#   2487#   2491#   2524#   2528#
            2532#   2569#   2572#   2585#   2590#   2607#   2659#   2661#   2675#   2679#   2697#   2756#   2759#   2773#   2778#
            2796#   2852#   2855#   2868#   2873#   2892#   2962#   2983#   2988#   3007#   3058#   3060#   3071#   3073#   3100#
            3142#   3144#   3155#   3157#   3169#   3208#   3210#   3219#   3221#   3235#   3242#   3280#   3282#   3291#   3293#
            3307#   3310#   3351#   3353#   3362#   3364#   3378#   3381#   3431#   3433#   3445#   3447#   3462#   3465#   3509#
            3511#   3520#   3522#   3535#   3582#   3584#   3593#   3595#   3617#   3671#   3674#   3685#   3687#   3698#   3703#
            3755#   3757#   3768#   3770#   3782#   3830#   3860#   3866#   3910#   3913#   3960#   3963#   4006#   4009#
M$ESCS      1216#   1218#   1223#   1225#   1228#   1240#   1243#   1248#   1250#   1258#   1302#   1312#   1354#   1361#   1396#
            1399#   1438#   1441#   1478#   1531#   1664#   1667#   1715#   1718#   1733#   1771#   1780#   1817#   1822#   1873#
            1878#   1929#   2015#   2018#   2065#   2068#   2106#   2109#   2146#   2195#   2243#   2246#   2267#   2270#   2273#
            2277#   2280#   2291#   2301#   2304#   2314#   2331#   2378#   2381#   2389#   2424#   2487#   2491#   2524#   2528#
            2532#   2569#   2572#   2585#   2590#   2607#   2659#   2661#   2675#   2679#   2697#   2756#   2759#   2773#   2778#
            2796#   2852#   2855#   2868#   2873#   2892#   2962#   2983#   2988#   3007#   3058#   3060#   3071#   3073#   3100#
            3142#   3144#   3155#   3157#   3169#   3208#   3210#   3219#   3221#   3235#   3242#   3280#   3282#   3291#   3293#
            3307#   3310#   3351#   3353#   3362#   3364#   3378#   3381#   3431#   3433#   3445#   3447#   3462#   3465#   3509#
            3511#   3520#   3522#   3535#   3582#   3584#   3593#   3595#   3617#   3671#   3674#   3685#   3687#   3698#   3703#
            3755#   3757#   3768#   3770#   3782#   3830#   3860#   3866#   3910#   3913#   3960#   3963#   4006#   4009#
M$EXCP      4030#   4032#   4033#   4034#   4055#   4058#
M$EXIT      1290#   1340#   1382#   1424#   1466#   1510#   1570#   1646#   1698#   1756#   1805#   1860#   1917#   1951#   1996#
            2052#   2092#   2134#   2174#   2228#   2359#   2413#   2476#   2493#   2510#   2554#   2641#   2737#   2834#   2942#
            3042#   3126#   3192#   3264#   3335#   3411#   3493#   3566#   3653#   3731#   3819#   3847#   3891#   3947#   3992#
M$EXSE      1290#   1340#   1382#   1424#   1466#   1510#   1570#   1646#   1698#   1756#   1805#   1860#   1917#   1951#   1996#
            2052#   2092#   2134#   2174#   2228#   2359#   2413#   2476#   2493#   2510#   2554#   2641#   2737#   2834#   2942#
            3042#   3126#   3192#   3264#   3335#   3411#   3493#   3566#   3653#   3731#   3819#   3847#   3891#   3947#   3992#
M$EXTJ      1290#   1340#   1382#   1424#   1466#   1510#   1570#   1646#   1698#   1756#   1805#   1860#   1917#   1951#   1996#
            2052#   2092#   2134#   2174#   2228#   2359#   2413#   2476#   2493#   2510#   2554#   2641#   2737#   2834#   2942#
            3042#   3126#   3192#   3264#   3335#   3411#   3493#   3566#   3653#   3731#   3819#   3847#   3891#   3947#   3992#
M$GEN         38#     40#     44#     46#     53#    108#    328#    429#    432#    440#    442#    449#    451#    459#    461#
             470#    472#    481#    483#    491#    493#    503#    505#    511#    515#    524#    526#    535#    537#    546#
             548#    557#    559#    568#    570#    578#    580#    589#    591#    598#    650#    656#    657#    666#    669#
             670#    678#    681#    683#    691#    692#    760#    766#    787#    794#    795#    807#    812#    813#    817#
             826#    916#    921#    926#    932#    934#    942#    945#    951#   1263#   1272#   1323#   1324#   1328#   1365#
            1366#   1370#   1408#   1409#   1413#   1451#   1452#   1456#   1494#   1495#   1499#   1548#   1549#   1555#   1623#
            1628#   1633#   1681#   1682#   1686#   1738#   1739#   1740#   1744#   1789#   1790#   1794#   1845#   1846#   1850#
            1900#   1901#   1906#   1935#   1936#   1940#   1975#   1976#   1980#   2037#   2038#   2042#   2077#   2078#   2082#
            2119#   2120#   2124#   2158#   2159#   2163#   2207#   2208#   2212#   2343#   2345#   2346#   2350#   2396#   2397#
            2409#   2440#   2441#   2445#   2492#   2496#   2500#   2533#   2536#   2543#   2622#   2623#   2624#   2628#   2715#
            2720#   2721#   2725#   2814#   2816#   2817#   2822#   2913#   2921#   2922#   2926#   3025#   3027#   3028#   3029#
            3033#   3109#   3110#   3112#   3116#   3174#   3175#   3176#   3177#   3181#   3246#   3247#   3248#   3252#   3319#
            3320#   3321#   3325#   3391#   3392#   3393#   3398#   3475#   3480#   3481#   3484#   3551#   3552#   3553#   3557#
            3634#   3635#   3636#   3641#   3708#   3714#   3715#   3720#   3794#   3795#   3805#   3806#   3815#   3834#   3835#
            3839#   3870#   3871#   3875#   3932#   3933#   3937#   3972#   3973#   3983#   4019#   4020#   4025#   4027#   4036#
            4049#   4051#   4062#   4072#
M$GETS        42#    103#    324#    427#    440#    449#    459#    470#    481#    491#    503#    511#    524#    535#    546#
             557#    568#    578#    589#    598#    647#    654#    666#    667#    678#    679#    685#    760#    761#    787#
            807#    808#    817#    818#    921#    932#    942#    951#   1216#   1218#   1223#   1225#   1228#   1240#   1243#
           1248#   1250#   1258#   1263#   1267#   1302#   1312#   1323#   1324#   1354#   1361#   1365#   1366#   1396#   1399#
           1408#   1409#   1438#   1441#   1451#   1452#   1478#   1494#   1495#   1531#   1548#   1549#   1623#   1628#   1664#
           1667#   1681#   1682#   1715#   1718#   1733#   1738#   1739#   1740#   1771#   1780#   1789#   1790#   1817#   1822#
           1845#   1846#   1873#   1878#   1900#   1901#   1929#   1935#   1936#   1975#   1976#   2015#   2018#   2037#   2038#
           2065#   2068#   2077#   2078#   2106#   2109#   2119#   2120#   2146#   2158#   2159#   2195#   2207#   2208#   2243#
           2246#   2267#   2270#   2273#   2277#   2280#   2291#   2301#   2304#   2314#   2331#   2343#   2345#   2346#   2378#
           2381#   2389#   2396#   2397#   2424#   2440#   2441#   2487#   2491#   2492#   2496#   2524#   2528#   2532#   2533#
           2536#   2569#   2572#   2585#   2590#   2607#   2622#   2623#   2624#   2659#   2661#   2675#   2679#   2697#   2715#
           2720#   2721#   2756#   2759#   2773#   2778#   2796#   2814#   2816#   2817#   2852#   2855#   2868#   2873#   2892#
           2913#   2921#   2922#   2962#   2983#   2988#   3007#   3025#   3027#   3028#   3029#   3058#   3060#   3071#   3073#
           3100#   3109#   3110#   3112#   3142#   3144#   3155#   3157#   3169#   3174#   3175#   3176#   3177#   3208#   3210#
           3219#   3221#   3235#   3242#   3246#   3247#   3248#   3280#   3282#   3291#   3293#   3307#   3310#   3319#   3320#
           3321#   3351#   3353#   3362#   3364#   3378#   3381#   3391#   3392#   3393#   3431#   3433#   3445#   3447#   3462#
           3465#   3475#   3480#   3481#   3509#   3511#   3520#   3522#   3535#   3551#   3552#   3553#   3582#   3584#   3593#
           3595#   3617#   3634#   3635#   3636#   3671#   3674#   3685#   3687#   3698#   3703#   3708#   3714#   3715#   3755#
           3757#   3768#   3770#   3782#   3794#   3795#   3805#   3806#   3830#   3834#   3835#   3860#   3866#   3870#   3871#
           3910#   3913#   3932#   3933#   3960#   3963#   3972#   3973#   4006#   4009#   4019#   4020#   4036#   4046#   4054#
           4057#   4062#   4069#
M$GETT     1216#   1218#   1223#   1225#   1228#   1240#   1243#   1248#   1250#   1258#   1290#   1302#   1312#   1340#   1354#
           1361#   1382#   1396#   1399#   1424#   1438#   1441#   1466#   1478#   1510#   1531#   1570#   1646#   1664#   1667#
           1698#   1715#   1718#   1733#   1756#   1771#   1780#   1805#   1817#   1822#   1860#   1873#   1878#   1917#   1929#
           1951#   1996#   2015#   2018#   2052#   2065#   2068#   2092#   2106#   2109#   2134#   2146#   2174#   2195#   2228#
           2243#   2246#   2267#   2270#   2273#   2277#   2280#   2291#   2301#   2304#   2314#   2331#   2359#   2378#   2381#
           2389#   2413#   2424#   2476#   2487#   2491#   2493#   2510#   2524#   2528#   2532#   2554#   2569#   2572#   2585#
           2590#   2607#   2641#   2659#   2661#   2675#   2679#   2697#   2737#   2756#   2759#   2773#   2778#   2796#   2834#
           2852#   2855#   2868#   2873#   2892#   2942#   2962#   2983#   2988#   3007#   3042#   3058#   3060#   3071#   3073#
           3100#   3126#   3142#   3144#   3155#   3157#   3169#   3192#   3208#   3210#   3219#   3221#   3235#   3242#   3264#
           3280#   3282#   3291#   3293#   3307#   3310#   3335#   3351#   3353#   3362#   3364#   3378#   3381#   3411#   3431#
           3433#   3445#   3447#   3462#   3465#   3493#   3509#   3511#   3520#   3522#   3535#   3566#   3582#   3584#   3593#
           3595#   3617#   3653#   3671#   3674#   3685#   3687#   3698#   3703#   3731#   3755#   3757#   3768#   3770#   3782#
           3819#   3830#   3847#   3860#   3866#   3891#   3910#   3913#   3947#   3960#   3963#   3992#   4006#   4009#   4054#
           4057#
M$GNGB       38#     40#     44#     46#     53#    108#    328#    429#    432#    442#    451#    461#    472#    483#    493#
            505#    515#    526#    537#    548#    559#    570#    580#    591#    650#    656#    657#    669#    670#    681#
            683#    691#    692#    766#    794#    795#    812#    813#    826#    916#    926#    934#    945#   4025#   4027#
           4049#   4051#   4072#
M$GNIN       40#     44#     46#    440#    449#    454#    459#    465#    470#    476#    481#    486#    491#    500#    503#
            511#    519#    524#    530#    535#    541#    546#    552#    557#    563#    568#    573#    578#    584#    589#
            595#    598#    600#    603#    604#    605#    606#    609#    610#    657#    670#    683#    693#    694#    695#
            698#    699#    700#    701#    708#    709#    718#    719#    748#    749#    751#    759#    760#    768#    771#
            774#    776#    782#    785#    787#    797#    801#    805#    807#    817#    834#    839#    852#    856#    863#
            864#    865#    866#    868#    869#    871#    873#    875#    876#    905#    910#    921#    932#    942#    951#
            954#    955#    961#    963#    964#   1030#   1181#   1196#   1208#   1216#   1218#   1223#   1225#   1228#   1240#
           1243#   1248#   1250#   1256#   1258#   1263#   1290#   1292#   1302#   1312#   1319#   1323#   1324#   1340#   1342#
           1350#   1354#   1356#   1360#   1361#   1365#   1366#   1382#   1384#   1396#   1399#   1404#   1408#   1409#   1424#
           1426#   1438#   1441#   1447#   1451#   1452#   1466#   1468#   1478#   1486#   1490#   1494#   1495#   1510#   1512#
           1514#   1523#   1524#   1529#   1531#   1540#   1544#   1548#   1549#   1566#   1570#   1572#   1574#   1575#   1576#
           1615#   1620#   1621#   1622#   1623#   1628#   1646#   1651#   1664#   1667#   1673#   1681#   1682#   1698#   1700#
           1715#   1718#   1723#   1731#   1733#   1738#   1739#   1740#   1756#   1761#   1771#   1779#   1780#   1789#   1790#
           1805#   1807#   1817#   1822#   1827#   1829#   1834#   1836#   1841#   1845#   1846#   1860#   1863#   1873#   1878#
           1883#   1885#   1890#   1891#   1896#   1900#   1901#   1917#   1919#   1929#   1935#   1936#   1951#   1953#   1960#
           1964#   1965#   1970#   1971#   1975#   1976#   1996#   1998#   2015#   2018#   2033#   2037#   2038#   2052#   2054#
           2065#   2068#   2073#   2077#   2078#   2092#   2094#   2106#   2109#   2115#   2119#   2120#   2134#   2136#   2146#
           2153#   2158#   2159#   2174#   2176#   2178#   2187#   2188#   2193#   2195#   2203#   2207#   2208#   2228#   2230#
           2232#   2238#   2243#   2246#   2267#   2270#   2273#   2277#   2280#   2289#   2291#   2301#   2304#   2314#   2320#
           2329#   2331#   2343#   2345#   2346#   2359#   2365#   2378#   2381#   2387#   2389#   2396#   2397#   2413#   2415#
           2424#   2431#   2436#   2440#   2441#   2476#   2478#   2487#   2490#   2491#   2492#   2493#   2496#   2510#   2512#
           2515#   2523#   2524#   2527#   2528#   2531#   2532#   2533#   2536#   2554#   2556#   2569#   2572#   2573#   2585#
           2590#   2594#   2607#   2612#   2616#   2618#   2622#   2623#   2624#   2641#   2646#   2659#   2661#   2662#   2675#
           2679#   2683#   2697#   2702#   2707#   2708#   2715#   2720#   2721#   2737#   2739#   2756#   2759#   2760#   2773#
           2778#   2782#   2796#   2801#   2805#   2806#   2814#   2816#   2817#   2834#   2836#   2852#   2855#   2856#   2868#
           2873#   2877#   2892#   2897#   2901#   2902#   2913#   2921#   2922#   2942#   2944#   2948#   2962#   2968#   2983#
           2988#   2992#   3007#   3012#   3016#   3017#   3025#   3027#   3028#   3029#   3042#   3044#   3058#   3060#   3071#
           3073#   3075#   3077#   3098#   3099#   3100#   3105#   3109#   3110#   3112#   3126#   3128#   3142#   3144#   3145#
           3155#   3157#   3159#   3169#   3174#   3175#   3176#   3177#   3192#   3194#   3208#   3210#   3219#   3221#   3223#
           3231#   3235#   3237#   3241#   3242#   3246#   3247#   3248#   3264#   3266#   3280#   3282#   3291#   3293#   3295#
           3307#   3310#   3315#   3319#   3320#   3321#   3335#   3337#   3351#   3353#   3362#   3364#   3366#   3378#   3381#
           3387#   3391#   3392#   3393#   3411#   3413#   3431#   3433#   3445#   3447#   3449#   3462#   3465#   3471#   3473#
           3475#   3480#   3481#   3493#   3495#   3509#   3511#   3520#   3522#   3524#   3535#   3542#   3547#   3551#   3552#
           3553#   3566#   3568#   3582#   3584#   3593#   3595#   3597#   3599#   3609#   3610#   3615#   3617#   3626#   3630#
           3634#   3635#   3636#   3653#   3655#   3671#   3674#   3685#   3687#   3689#   3698#   3703#   3705#   3706#   3708#
           3714#   3715#   3731#   3739#   3755#   3757#   3758#   3768#   3770#   3772#   3782#   3789#   3794#   3795#   3805#
           3806#   3819#   3821#   3830#   3834#   3835#   3847#   3849#   3855#   3859#   3860#   3865#   3866#   3870#   3871#
           3891#   3893#   3910#   3913#   3928#   3932#   3933#   3947#   3949#   3960#   3963#   3968#   3972#   3973#   3992#
           3994#   4006#   4009#   4015#   4019#   4020#   4027#   4029#   4030#   4031#   4032#   4033#   4034#   4036#   4051#
           4053#   4054#   4055#   4056#   4057#   4058#   4062#   4072#
M$GNLS     1263#   1323#   1365#   1408#   1451#   1494#   1548#   1623#   1681#   1738#   1739#   1789#   1845#   1900#   1935#
           1975#   2037#   2077#   2119#   2158#   2207#   2343#   2345#   2396#   2440#   2492#   2533#   2622#   2623#   2715#
           2720#   2814#   2816#   2913#   2921#   3025#   3027#   3028#   3109#   3110#   3174#   3175#   3176#   3246#   3247#
           3319#   3320#   3391#   3392#   3475#   3480#   3551#   3552#   3634#   3635#   3708#   3714#   3794#   3795#   3805#
           3834#   3870#   3932#   3972#   4019#
M$GNTA      440#    449#    459#    470#    481#    491#    503#    511#    524#    535#    546#    557#    568#    578#    589#
            598#    666#    678#    760#    787#    807#    817#    921#    932#    942#    951#   1324#   1366#   1409#   1452#
           1495#   1549#   1628#   1682#   1740#   1790#   1846#   1901#   1936#   1976#   2038#   2078#   2120#   2159#   2208#
           2346#   2397#   2441#   2496#   2536#   2624#   2721#   2817#   2922#   3029#   3112#   3177#   3248#   3321#   3393#
           3481#   3553#   3636#   3715#   3806#   3835#   3871#   3933#   3973#   4020#   4036#   4062#
M$GNTE     1272#   1328#   1370#   1413#   1456#   1499#   1555#   1633#   1686#   1744#   1794#   1850#   1906#   1940#   1980#
           2042#   2082#   2124#   2163#   2212#   2350#   2409#   2445#   2500#   2543#   2628#   2725#   2822#   2926#   3033#
           3116#   3181#   3252#   3325#   3398#   3484#   3557#   3641#   3720#   3815#   3839#   3875#   3937#   3983#
M$HAPT       40#
M$HNAP       40#
M$INCR       38#     53#    108#    328#    429#    432#    440#    442#    449#    451#    454#    459#    461#    465#    470#
            472#    476#    481#    483#    486#    491#    493#    500#    503#    505#    511#    515#    519#    524#    526#
            530#    535#    537#    541#    546#    548#    552#    557#    559#    563#    568#    570#    573#    578#    580#
            584#    589#    591#    595#    598#    600#    603#    604#    605#    606#    609#    610#    650#    656#    657#
            669#    670#    681#    691#    692#    693#    694#    698#    700#    708#    718#    748#    749#    751#    759#
            760#    766#    768#    771#    774#    776#    782#    785#    787#    794#    795#    797#    801#    805#    807#
            812#    813#    817#    826#    863#    865#    868#    871#    873#    875#    876#    905#    910#    916#    926#
            934#    945#    954#    961#    963#    964#   1030#   1181#   1196#   1208#   1216#   1218#   1223#   1225#   1228#
           1240#   1243#   1248#   1250#   1256#   1258#   1263#   1272#   1290#   1292#   1302#   1312#   1319#   1323#   1324#
           1328#   1340#   1342#   1350#   1354#   1356#   1360#   1361#   1365#   1366#   1370#   1382#   1384#   1396#   1399#
           1404#   1408#   1409#   1413#   1424#   1426#   1438#   1441#   1447#   1451#   1452#   1456#   1466#   1468#   1478#
           1486#   1490#   1494#   1495#   1499#   1510#   1512#   1514#   1523#   1524#   1529#   1531#   1540#   1544#   1548#
           1549#   1555#   1566#   1570#   1572#   1574#   1575#   1576#   1615#   1620#   1621#   1622#   1623#   1628#   1633#
           1646#   1651#   1664#   1667#   1673#   1681#   1682#   1686#   1698#   1700#   1715#   1718#   1723#   1731#   1733#
           1738#   1739#   1740#   1744#   1756#   1761#   1771#   1779#   1780#   1789#   1790#   1794#   1805#   1807#   1817#
           1822#   1827#   1829#   1834#   1836#   1841#   1845#   1846#   1850#   1860#   1863#   1873#   1878#   1883#   1885#
           1890#   1891#   1896#   1900#   1901#   1906#   1917#   1919#   1929#   1935#   1936#   1940#   1951#   1953#   1960#
           1964#   1965#   1970#   1971#   1975#   1976#   1980#   1996#   1998#   2015#   2018#   2033#   2037#   2038#   2042#
           2052#   2054#   2065#   2068#   2073#   2077#   2078#   2082#   2092#   2094#   2106#   2109#   2115#   2119#   2120#
           2124#   2134#   2136#   2146#   2153#   2158#   2159#   2163#   2174#   2176#   2178#   2187#   2188#   2193#   2195#
```

```
            2203#   2207#   2208#   2212#   2228#   2230#   2232#   2238#   2243#   2246#   2267#   2270#   2273#   2277#   2280#
            2289#   2291#   2301#   2304#   2314#   2320#   2329#   2331#   2343#   2345#   2346#   2350#   2359#   2365#   2378#
            2381#   2387#   2389#   2396#   2397#   2409#   2413#   2415#   2424#   2431#   2436#   2440#   2441#   2445#   2476#
            2478#   2487#   2490#   2491#   2492#   2493#   2496#   2500#   2510#   2512#   2515#   2523#   2524#   2527#   2528#
            2531#   2532#   2533#   2536#   2543#   2554#   2556#   2569#   2572#   2573#   2585#   2590#   2594#   2607#   2612#
            2616#   2618#   2622#   2623#   2624#   2628#   2641#   2646#   2659#   2661#   2662#   2675#   2679#   2683#   2697#
            2702#   2707#   2708#   2715#   2720#   2721#   2725#   2737#   2739#   2756#   2759#   2760#   2773#   2778#   2782#
            2796#   2801#   2805#   2806#   2814#   2816#   2817#   2822#   2834#   2836#   2852#   2855#   2856#   2868#   2873#
            2877#   2892#   2897#   2901#   2902#   2913#   2921#   2922#   2926#   2942#   2944#   2948#   2962#   2968#   2983#
            2988#   2992#   3007#   3012#   3016#   3017#   3025#   3027#   3028#   3029#   3033#   3042#   3044#   3058#   3060#
            3071#   3073#   3075#   3077#   3098#   3099#   3100#   3105#   3109#   3110#   3112#   3116#   3126#   3128#   3142#
            3144#   3145#   3155#   3157#   3159#   3169#   3174#   3175#   3176#   3177#   3181#   3192#   3194#   3208#   3210#
            3219#   3221#   3223#   3231#   3235#   3237#   3241#   3242#   3246#   3247#   3248#   3252#   3264#   3266#   3280#
            3282#   3291#   3293#   3295#   3307#   3310#   3315#   3319#   3320#   3321#   3325#   3335#   3337#   3351#   3353#
            3362#   3364#   3366#   3378#   3381#   3387#   3391#   3392#   3393#   3398#   3411#   3413#   3431#   3433#   3445#
            3447#   3449#   3462#   3465#   3471#   3473#   3475#   3480#   3481#   3484#   3493#   3495#   3509#   3511#   3520#
            3522#   3524#   3535#   3542#   3547#   3551#   3552#   3553#   3557#   3566#   3568#   3582#   3584#   3593#   3595#
            3597#   3599#   3609#   3610#   3615#   3617#   3626#   3630#   3634#   3635#   3636#   3641#   3653#   3655#   3671#
            3674#   3685#   3687#   3689#   3698#   3703#   3705#   3706#   3708#   3714#   3715#   3720#   3731#   3739#   3755#
            3757#   3758#   3768#   3770#   3772#   3782#   3789#   3794#   3795#   3805#   3806#   3815#   3819#   3821#   3830#
            3834#   3835#   3839#   3847#   3849#   3855#   3859#   3860#   3865#   3866#   3870#   3871#   3875#   3891#   3893#
            3910#   3913#   3928#   3932#   3933#   3937#   3947#   3949#   3960#   3963#   3968#   3972#   3973#   3983#   3992#
            3994#   4006#   4009#   4015#   4019#   4020#   4025#   4027#   4049#   4051#
M$LDRO       693#    694#    698#    700#    708#    718#    751#    771#    776#    785#    801#    805#    863#    865#    873#
             875#    876#    963#   1350#   1356#   1514#   1524#   1574#   1576#   1615#   1621#   1960#   1965#   2178#   2188#
            2232#   2515#   2523#   3099#   3231#   3237#   3599#   3610#   3855#   3859#
M$MCHI        31#
M$MCLO        31#
M$POP         42#    103#    324#    427#    440#    449#    459#    470#    481#    491#    503#    511#    524#    535#    546#
             557#    568#    578#    589#    598#    647#    654#    666#    667#    678#    679#    685#    760#    761#    787#
             807#    808#    817#    818#    921#    932#    942#    951#   1263#   1267#   1323#   1324#   1365#   1366#   1408#
            1409#   1451#   1452#   1494#   1495#   1548#   1549#   1623#   1628#   1681#   1682#   1738#   1739#   1740#   1789#
            1790#   1845#   1846#   1900#   1901#   1935#   1936#   1975#   1976#   2037#   2038#   2077#   2078#   2119#   2120#
            2158#   2159#   2207#   2208#   2343#   2345#   2346#   2396#   2397#   2440#   2441#   2492#   2496#   2533#   2536#
            2622#   2623#   2624#   2715#   2720#   2721#   2814#   2816#   2817#   2913#   2921#   2922#   3025#   3027#   3028#
            3029#   3109#   3110#   3112#   3174#   3175#   3176#   3177#   3246#   3247#   3248#   3319#   3320#   3321#   3391#
            3392#   3393#   3475#   3480#   3481#   3551#   3552#   3553#   3634#   3635#   3636#   3708#   3714#   3715#   3794#
            3795#   3805#   3806#   3834#   3835#   3870#   3871#   3932#   3933#   3972#   3973#   4019#   4020#   4036#   4046#
            4062#   4069#
M$PRIN       454#    465#    476#    486#    500#    519#    530#    541#    552#    563#    573#    584#    595#    600#    603#
             604#    605#    606#    609#    610#    748#    749#    774#    782#    961#   1566#   2616#   2707#   2805#   2901#
            3016#
M$PUSH        38#     53#    108#    328#    429#    432#    442#    451#    461#    472#    483#    493#    505#    515#    526#
             537#    548#    559#    570#    580#    591#    650#    656#    657#    669#    670#    681#    691#    692#    766#
             794#    795#    812#    813#    826#    916#    926#    934#    945#   1208#   1272#   1292#   1328#   1342#   1370#
            1384#   1413#   1426#   1456#   1468#   1499#   1512#   1555#   1572#   1633#   1651#   1686#   1700#   1723#   1744#
            1761#   1794#   1807#   1850#   1863#   1906#   1919#   1940#   1953#   1980#   1998#   2042#   2054#   2082#   2094#
            2124#   2136#   2163#   2176#   2212#   2230#   2238#   2350#   2365#   2409#   2415#   2445#   2478#   2500#   2512#
            2543#   2556#   2573#   2628#   2646#   2662#   2725#   2739#   2760#   2822#   2836#   2856#   2926#   2944#   2948#
            2968#   3033#   3044#   3075#   3116#   3128#   3145#   3159#   3181#   3194#   3223#   3252#   3266#   3295#   3325#
            3337#   3366#   3398#   3413#   3449#   3484#   3495#   3524#   3557#   3568#   3597#   3641#   3655#   3689#   3720#
            3739#   3758#   3772#   3815#   3821#   3839#   3849#   3875#   3893#   3937#   3949#   3983#   3994#   4025#   4027#
            4049#   4051#
M$PUT        454#    465#    476#    486#    500#    519#    530#    541#    552#    563#    573#    584#    595#    600#    603#
             604#    605#    606#    609#    610#    748#    749#    759#    768#    774#    782#    797#    871#    905#    910#
             961#   1566#   1575#   1622#   2616#   2707#   2805#   2901#   3016#   3077#
```

```
M$PUT1     454#    465#    476#    486#    500#    519#    530#    541#    552#    563#    573#    584#    595#    600#    603#
           604#    605#    606#    609#    610#    748#    749#    759#    768#    774#    782#    797#    871#    905#    910#
           961#   1566#   1575#   1622#   2616#   2707#   2805#   2901#   3016#   3077#
M$RADI    4029#   4030#   4031#   4032#   4033#   4034#   4053#   4055#   4056#   4058#
M$RNRO     718#    863#    865#
M$SETS      38#     53#    108#    328#    429#    432#    442#    451#    461#    472#    483#    493#    505#    515#    526#
           537#    548#    559#    570#    580#    591#    650#    656#    657#    669#    670#    681#    691#    692#    766#
           794#    795#    812#    813#    826#    916#    926#    934#    945#   1208#   1272#   1292#   1328#   1342#   1370#
          1384#   1413#   1426#   1456#   1468#   1499#   1512#   1555#   1572#   1633#   1651#   1686#   1700#   1723#   1744#
          1761#   1794#   1807#   1850#   1863#   1906#   1919#   1940#   1953#   1980#   1998#   2042#   2054#   2082#   2094#
          2124#   2136#   2163#   2176#   2212#   2230#   2238#   2350#   2365#   2409#   2415#   2445#   2478#   2500#   2512#
          2543#   2556#   2573#   2628#   2646#   2662#   2725#   2739#   2760#   2822#   2836#   2856#   2926#   2944#   2948#
          2968#   3033#   3044#   3075#   3116#   3128#   3145#   3159#   3181#   3194#   3223#   3252#   3266#   3295#   3325#
          3337#   3366#   3398#   3413#   3449#   3484#   3495#   3524#   3557#   3568#   3597#   3641#   3655#   3689#   3720#
          3739#   3758#   3772#   3815#   3821#   3839#   3849#   3875#   3893#   3937#   3949#   3983#   3994#   4025#   4027#
          4049#   4051#
M$SVC      440#    449#    454#    459#    465#    470#    476#    481#    486#    491#    500#    503#    511#    519#    524#
           530#    535#    541#    546#    552#    557#    563#    568#    573#    578#    584#    589#    595#    598#    600#
           603#    604#    605#    606#    609#    610#    693#    694#    698#    700#    708#    718#    748#    749#    751#
           759#    760#    768#    771#    774#    776#    782#    785#    787#    797#    801#    805#    807#    817#    863#
           865#    868#    871#    873#    875#    876#    905#    910#    954#    961#    963#    964#   1030    1181    1196
          1208#   1216#   1218#   1223#   1225#   1228#   1240#   1243#   1248#   1250#   1256    1258#   1263#   1290#   1292#
          1302#   1312#   1319    1323#   1324#   1340#   1342#   1350#   1354#   1356#   1360    1361#   1365#   1366#   1382#
          1384#   1396#   1399#   1404    1408#   1409#   1424#   1426#   1438#   1441#   1447    1451#   1452#   1466#   1468#
          1478#   1486#   1490    1494#   1495#   1510#   1512#   1514#   1523#   1524#   1529    1531#   1540#   1544    1548#
          1549#   1566#   1570#   1572#   1574#   1575#   1576#   1615#   1620    1621#   1622#   1623#   1628#   1646#   1651#
          1664#   1667#   1673    1681#   1682#   1698#   1700#   1715#   1718#   1723#   1731    1733#   1738#   1739#   1740#
          1756#   1761#   1771#   1779    1780#   1789#   1790#   1805#   1807#   1817#   1822#   1827    1829#   1834    1836#
          1841    1845#   1846#   1860#   1863#   1873#   1878#   1883    1885#   1890    1891#   1896    1900#   1901#   1917#
          1919#   1929#   1935#   1936#   1951#   1953#   1960#   1964#   1965#   1970    1971#   1975#   1976#   1996#   1998#
          2015#   2018#   2033    2037#   2038#   2052#   2054#   2065#   2068#   2073    2077#   2078#   2092#   2094#   2106#
          2109#   2115    2119#   2120#   2134#   2136#   2146#   2153    2158#   2159#   2174#   2176#   2178#   2187#   2188#
          2193    2195#   2203    2207#   2208#   2228#   2230#   2232#   2238#   2243#   2246#   2267#   2270#   2273#   2277#
          2280#   2289    2291#   2301#   2304#   2314#   2320#   2329    2331#   2343#   2345#   2346#   2359#   2365#   2378#
          2381#   2387    2389#   2396#   2397#   2413#   2415#   2424#   2431#   2436    2440#   2441#   2476#   2478#   2487#
          2490    2491#   2492#   2493#   2496#   2510#   2512#   2515#   2523#   2524#   2527    2528#   2531    2532#   2533#
          2536#   2554#   2556#   2569#   2572#   2573#   2585#   2590#   2594#   2607#   2612    2616#   2618#   2622#   2623#
          2624#   2641#   2646#   2659#   2661#   2662#   2675#   2679#   2683#   2697#   2702    2707#   2708#   2715#   2720#
          2721#   2737#   2739#   2756#   2759#   2760#   2773#   2778#   2782#   2796#   2801    2805#   2806#   2814#   2816#
          2817#   2834#   2836#   2852#   2855#   2856#   2868#   2873#   2877#   2892#   2897    2901#   2902#   2913#   2921#
          2922#   2942#   2944#   2948#   2962#   2968#   2983#   2988#   2992#   3007#   3012    3016#   3017#   3025#   3027#
          3028#   3029#   3042#   3044#   3058#   3060#   3071#   3073#   3075#   3077#   3098    3099#   3100#   3105    3109#
          3110#   3112#   3126#   3128#   3142#   3144#   3145#   3155#   3157#   3159#   3169#   3174#   3175#   3176#   3177#
          3192#   3194#   3208#   3210#   3219#   3221#   3223#   3231#   3235#   3237#   3241    3242#   3246#   3247#   3248#
          3264#   3266#   3280#   3282#   3291#   3293#   3295#   3307#   3310#   3315    3319#   3320#   3321#   3335#   3337#
          3351#   3353#   3362#   3364#   3366#   3378#   3381#   3387    3391#   3392#   3393#   3411#   3413#   3431#   3433#
          3445#   3447#   3449#   3462#   3465#   3471    3473#   3475#   3480#   3481#   3493#   3495#   3509#   3511#   3520#
          3522#   3524#   3535#   3542#   3547    3551#   3552#   3553#   3566#   3568#   3582#   3584#   3593#   3595#   3597#
          3599#   3609#   3610#   3615    3617#   3626#   3630    3634#   3635#   3636#   3653#   3655#   3671#   3674#   3685#
          3687#   3689#   3698#   3703#   3705#   3706    3708#   3714#   3715#   3731#   3739#   3755#   3757#   3758#   3768#
          3770#   3772#   3782#   3789    3794#   3795#   3805#   3806#   3819#   3821#   3830#   3834#   3835#   3847#   3849#
          3855#   3859#   3860#   3865    3866#   3870#   3871#   3891#   3893#   3910#   3913#   3928    3932#   3933#   3947#
          3949#   3960#   3963#   3968    3972#   3973#   3992#   3994#   4006#   4009#   4015    4019#   4020#
M$TLAB     440#    449#    454#    459#    465#    470#    476#    481#    486#    491#    500#    503#    511#    519#    524#
           530#    535#    541#    546#    552#    557#    563#    568#    573#    578#    584#    589#    595#    598#    600#
           603#    604#    605#    606#    609#    610#    693#    694#    698#    700#    708#    718#    748#    749#    751#
```

```
            759#    760#    768#    771#    774#    776#    782#    785#    787#    797#    801#    805#    807#    817#    863#
            865#    868#    871#    873#    875#    876#    905#    910#    954#    961#    963#    964#   1030#   1181#   1196#
           1208#   1216#   1218#   1223#   1225#   1228#   1240#   1243#   1248#   1250#   1256#   1258#   1263#   1290#   1292#
           1302#   1312#   1319#   1323#   1324#   1340#   1342#   1350#   1354#   1356#   1360#   1361#   1365#   1366#   1382#
           1384#   1396#   1399#   1404#   1408#   1409#   1424#   1426#   1438#   1441#   1447#   1451#   1452#   1466#   1468#
           1478#   1486#   1490#   1494#   1495#   1510#   1512#   1514#   1523#   1524#   1529#   1531#   1540#   1544#   1548#
           1549#   1566#   1570#   1572#   1574#   1575#   1576#   1615#   1620#   1621#   1622#   1623#   1628#   1646#   1651#
           1664#   1667#   1673#   1681#   1682#   1698#   1700#   1715#   1718#   1723#   1731#   1733#   1738#   1739#   1740#
           1756#   1761#   1771#   1779#   1780#   1789#   1790#   1805#   1807#   1817#   1822#   1827#   1829#   1834#   1836#
           1841#   1845#   1846#   1860#   1863#   1873#   1878#   1883#   1885#   1890#   1891#   1896#   1900#   1901#   1917#
           1919#   1929#   1935#   1936#   1951#   1953#   1960#   1964#   1965#   1970#   1971#   1975#   1976#   1996#   1998#
           2015#   2018#   2033#   2037#   2038#   2052#   2054#   2065#   2068#   2073#   2077#   2078#   2092#   2094#   2106#
           2109#   2115#   2119#   2120#   2134#   2136#   2146#   2153#   2158#   2159#   2174#   2176#   2178#   2187#   2188#
           2193#   2195#   2203#   2207#   2208#   2228#   2230#   2232#   2238#   2243#   2246#   2267#   2270#   2273#   2277#
           2280#   2289#   2291#   2301#   2304#   2314#   2320#   2329#   2331#   2343#   2345#   2346#   2359#   2365#   2378#
           2381#   2387#   2389#   2396#   2397#   2413#   2415#   2424#   2431#   2436#   2440#   2441#   2476#   2478#   2487#
           2490#   2491#   2492#   2493#   2496#   2510#   2512#   2515#   2523#   2524#   2527#   2528#   2531#   2532#   2533#
           2536#   2554#   2556#   2569#   2572#   2573#   2585#   2590#   2594#   2607#   2612#   2616#   2618#   2622#   2623#
           2624#   2641#   2646#   2659#   2661#   2662#   2675#   2679#   2683#   2697#   2702#   2707#   2708#   2715#   2720#
           2721#   2737#   2739#   2756#   2759#   2760#   2773#   2778#   2782#   2796#   2801#   2805#   2806#   2814#   2816#
           2817#   2834#   2836#   2852#   2855#   2856#   2868#   2873#   2877#   2892#   2897#   2901#   2902#   2913#   2921#
           2922#   2942#   2944#   2948#   2962#   2968#   2983#   2988#   2992#   3007#   3012#   3016#   3017#   3025#   3027#
           3028#   3029#   3042#   3044#   3058#   3060#   3071#   3073#   3075#   3077#   3098#   3099#   3100#   3105#   3109#
           3110#   3112#   3126#   3128#   3142#   3144#   3145#   3155#   3157#   3159#   3169#   3174#   3175#   3176#   3177#
           3192#   3194#   3208#   3210#   3219#   3221#   3223#   3231#   3235#   3237#   3241#   3242#   3246#   3247#   3248#
           3264#   3266#   3280#   3282#   3291#   3293#   3295#   3307#   3310#   3315#   3319#   3320#   3321#   3335#   3337#
           3351#   3353#   3362#   3364#   3366#   3378#   3381#   3387#   3391#   3392#   3393#   3411#   3413#   3431#   3433#
           3445#   3447#   3449#   3462#   3465#   3471#   3473#   3475#   3480#   3481#   3493#   3495#   3509#   3511#   3520#
           3522#   3524#   3535#   3542#   3547#   3551#   3552#   3553#   3566#   3568#   3582#   3584#   3593#   3595#   3597#
           3599#   3609#   3610#   3615#   3617#   3626#   3630#   3634#   3635#   3636#   3653#   3655#   3671#   3674#   3685#
           3687#   3689#   3698#   3703#   3705#   3706#   3708#   3714#   3715#   3731#   3739#   3755#   3757#   3758#   3768#
           3770#   3772#   3782#   3789#   3794#   3795#   3805#   3806#   3819#   3821#   3830#   3834#   3835#   3847#   3849#
           3855#   3859#   3860#   3865#   3866#   3870#   3871#   3891#   3893#   3910#   3913#   3928#   3932#   3933#   3947#
           3949#   3960#   3963#   3968#   3972#   3973#   3992#   3994#   4006#   4009#   4015#   4019#   4020#
M$TSTL      440#    449#    454#    459#    465#    470#    476#    481#    486#    491#    500#    503#    511#    519#    524#
            530#    535#    541#    546#    552#    557#    563#    568#    573#    578#    584#    589#    595#    598#    600#
            603#    604#    605#    606#    609#    610#    693#    694#    698#    700#    708#    718#    748#    749#    751#
            759#    760#    768#    771#    774#    776#    782#    785#    787#    797#    801#    805#    807#    817#    863#
            865#    868#    871#    873#    875#    876#    905#    910#    954#    961#    963#    964#   1030#   1181#   1196#
           1208#   1216#   1218#   1223#   1225#   1228#   1240#   1243#   1248#   1250#   1256#   1258#   1263#   1290#   1292#
           1302#   1312#   1319#   1323#   1324#   1340#   1342#   1350#   1354#   1356#   1360#   1361#   1365#   1366#   1382#
           1384#   1396#   1399#   1404#   1408#   1409#   1424#   1426#   1438#   1441#   1447#   1451#   1452#   1466#   1468#
           1478#   1486#   1490#   1494#   1495#   1510#   1512#   1514#   1523#   1524#   1529#   1531#   1540#   1544#   1548#
           1549#   1566#   1570#   1572#   1574#   1575#   1576#   1615#   1620#   1621#   1622#   1623#   1628#   1646#   1651#
           1664#   1667#   1673#   1681#   1682#   1698#   1700#   1715#   1718#   1723#   1731#   1733#   1738#   1739#   1740#
           1756#   1761#   1771#   1779#   1780#   1789#   1790#   1805#   1807#   1817#   1822#   1827#   1829#   1834#   1836#
           1841#   1845#   1846#   1860#   1863#   1873#   1878#   1883#   1885#   1890#   1891#   1896#   1900#   1901#   1917#
           1919#   1929#   1935#   1936#   1951#   1953#   1960#   1964#   1965#   1970#   1971#   1975#   1976#   1996#   1998#
           2015#   2018#   2033#   2037#   2038#   2052#   2054#   2065#   2068#   2073#   2077#   2078#   2092#   2094#   2106#
           2109#   2115#   2119#   2120#   2134#   2136#   2146#   2153#   2158#   2159#   2174#   2176#   2178#   2187#   2188#
           2193#   2195#   2203#   2207#   2208#   2228#   2230#   2232#   2238#   2243#   2246#   2267#   2270#   2273#   2277#
           2280#   2289#   2291#   2301#   2304#   2314#   2320#   2329#   2331#   2343#   2345#   2346#   2359#   2365#   2378#
           2381#   2387#   2389#   2396#   2397#   2413#   2415#   2424#   2431#   2436#   2440#   2441#   2476#   2478#   2487#
           2490#   2491#   2492#   2493#   2496#   2510#   2512#   2515#   2523#   2524#   2527#   2528#   2531#   2532#   2533#
           2536#   2554#   2556#   2569#   2572#   2573#   2585#   2590#   2594#   2607#   2612#   2616#   2618#   2622#   2623#
           2624#   2641#   2646#   2659#   2661#   2662#   2675#   2679#   2683#   2697#   2702#   2707#   2708#   2715#   2720#
```

```
            2721#    2737#    2739#    2756#    2759#    2760#    2773#    2778#    2782#    2796#    2801#    2805#    2806#    2814#    2816#
            2817#    2834#    2836#    2852#    2855#    2856#    2868#    2873#    2877#    2892#    2897#    2901#    2902#    2913#    2921#
            2922#    2942#    2944#    2948#    2962#    2968#    2983#    2988#    2992#    3007#    3012#    3016#    3017#    3025#    3027#
            3028#    3029#    3042#    3044#    3058#    3060#    3071#    3073#    3075#    3077#    3098#    3099#    3100#    3105#    3109#
            3110#    3112#    3126#    3128#    3142#    3144#    3145#    3155#    3157#    3159#    3169#    3174#    3175#    3176#    3177#
            3192#    3194#    3208#    3210#    3219#    3221#    3223#    3231#    3235#    3237#    3241#    3242#    3246#    3247#    3248#
            3264#    3266#    3280#    3282#    3291#    3293#    3295#    3307#    3310#    3315#    3319#    3320#    3321#    3335#    3337#
            3351#    3353#    3362#    3364#    3366#    3378#    3381#    3387#    3391#    3392#    3393#    3411#    3413#    3431#    3433#
            3445#    3447#    3449#    3462#    3465#    3471#    3473#    3475#    3480#    3481#    3493#    3495#    3509#    3511#    3520#
            3522#    3524#    3535#    3542#    3547#    3551#    3552#    3553#    3566#    3568#    3582#    3584#    3593#    3595#    3597#
            3599#    3609#    3610#    3615#    3617#    3626#    3630#    3634#    3635#    3636#    3653#    3655#    3671#    3674#    3685#
            3687#    3689#    3698#    3703#    3705#    3706#    3708#    3714#    3715#    3731#    3739#    3755#    3757#    3758#    3768#
            3770#    3772#    3782#    3789#    3794#    3795#    3805#    3806#    3819#    3821#    3830#    3834#    3835#    3847#    3849#
            3855#    3859#    3860#    3865#    3866#    3870#    3871#    3891#    3893#    3910#    3913#    3928#    3932#    3933#    3947#
            3949#    3960#    3963#    3968#    3972#    3973#    3992#    3994#    4006#    4009#    4015#    4019#    4020#
M$WORD        40#     683#    1030#    1181#    1196#    1256#    1290#    1319#    1340#    1360#    1382#    1404#    1424#    1447#    1466#
            1490#    1510#    1529#    1544#    1570#    1620#    1646#    1673#    1698#    1731#    1756#    1779#    1805#    1827#    1834#
            1841#    1860#    1883#    1890#    1896#    1917#    1951#    1970#    1996#    2033#    2052#    2073#    2092#    2115#    2134#
            2153#    2174#    2193#    2203#    2228#    2289#    2329#    2359#    2387#    2413#    2436#    2476#    2490#    2493#    2510#
            2527#    2531#    2554#    2612#    2641#    2702#    2737#    2801#    2834#    2897#    2942#    3012#    3042#    3098#    3105#
            3126#    3192#    3241#    3264#    3315#    3335#    3387#    3411#    3471#    3493#    3547#    3566#    3615#    3630#    3653#
            3706#    3731#    3789#    3819#    3847#    3865#    3891#    3928#    3947#    3968#    3992#    4015#    4029#    4030#    4031#
            4032#    4033#    4034#    4053#    4054#    4055#    4056#    4057#    4058#    4072
M$XFER      4054#    4057#
POINTE        36
PRINTB       454      465      476      486      500      519      530      541      552      563      573      584      595      600      603
             604      605      606      609      610      774      782     1566     2616     2707     2805     2901     3016
PRINTF       748      749      961
READBU       868
READEF       694      698      700      708
SETPRI       693      873      875     1350     1356     1514     1524     1576     1615     1960     1965     2178     2188     2232     2515
            2523     3231     3237     3599     3610     3855     3859
SETVEC       759      768      797      871      905      910     1575     1622     3077
STARS       1276     1286     1330     1336     1373     1378     1415     1420     1458     1463     1502     1506     1557     1561     1635
            1641     1688     1694     1746     1752     1796     1801     1852     1857     1908     1913     1942     1947     1982     1992
            2044     2048     2084     2089     2126     2131     2166     2170     2214     2224     2352     2355     2398     2404     2447
            2451     2467     2472     2501     2504     2545     2550     2632     2637     2729     2733     2826     2831     2929     2938
            3035     3038     3118     3122     3183     3188     3255     3260     3327     3331     3400     3406     3486     3490     3560
            3562     3645     3650     3722     3727     3809     3814     3841     3844     3877     3887     3939     3943     3985     3989
SVC            5#      31
WAITMS        22#     743      874
WAITUS        17#    1177     1191     3093
XFER        1290#    1340#    1382#    1424#    1466#    1510#    1570#    1646#    1698#    1756#    1805#    1860#    1917#    1951#    1996#
            2052#    2092#    2134#    2174#    2228#    2359#    2413#    2476#    2493#    2510#    2554#    2641#    2737#    2834#    2942#
            3042#    3126#    3192#    3264#    3335#    3411#    3493#    3566#    3653#    3731#    3819#    3847#    3891#    3947#    3992#
XFERF       4054     4057


. ABS.  034152      000


 ERRORS DETECTED:  0

 ,CZRLHB.LST/CRF=SVC33/ML,CZRLHB.MAC
 RUN-TIME: 153 156 21 SECONDS
 RUN-TIME RATIO: 503/332=1.5
 CORE USED:  20K  (39 PAGES)
```